An Empirical Analysis of Musical Expression in Recordings by Selected Cellists

by

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I declare that the work presented in this thesis is the outcome of my own original research.

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Abstract

This thesis aims to explain how recorded cello performance styles changed over the course of the 20th century, with particular reference to works by Brahms, J.S.Bach and Prokofiev. I show how reviews of these recordings changed over the same time scale. These changes are evidenced by a detailed empirical analysis of musical expression in selected cello recordings.

This study addresses the following issues:

- The reception trends of recordings: I investigate how reviews of these recordings changed over the same time scale and how the study of record reviews could play an integrated role in the empirical investigations into cello performance practice on record.
- Performance trends of Brahms: I consider whether any particular trends were detected in the handling of musical expression in performances of Brahms, including pedagogical similarities.
- Performance styles of Casals' interpretations of Bach and Rostropovich's of Prokofiev and whether any stylistic changes were shown.

An empirical analysis of musical expression in 20th-century cello playing on record reveals a number of issues in performance practice.

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[1] Seminars presented in the Centre for Digital Music (C4DM), Queen Mary seminars in 2007 and 2009 and the Intelligent Sound and Music Systems (ISMS) group, Goldsmiths in 2010.

[2] Performance analysis workshops in the music department, Royal Holloway in 2006, and Digital Music Research Network workshop in the Centre for Digital Music, Queen Mary in 2007.

[3] International conference presentations include the RMA Annual conferences in 2004 (Birmingham) and in 2007 (Royal Holloway, CHARM/RMA), the Digital Music conference in 2006 (ISMS, Goldsmiths), the Reflective Conservatoire conference in 2006 (Guildhall School of Music and Drama, with a SEMPRE conference award), the Empirical Musicology conference in 2008 (IMR, London) and the Empirical Musicology II conference in 2010 (Leeds, with a joint SEMPRE Hickman award).

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Preface

An empirical approach towards performance history archived in sound recordings is a relatively new area of research. With my background in cello performance and interdisciplinary empirical studies of music performance, this thesis aims to show how recorded cello performance styles changed over the course of the 20th century, with particular reference to works by Brahms, J.S.Bach and Prokofiev. I show how reviews of these recordings changed over the same time scale. These changes are evidenced by the detailed empirical analyses of musical expression in selected cello recordings. Based on empirically proven sets of data, the current study concerning an empirical approach to musical expression in cello playing on record brings an essential level of objectivity to musicology on one hand and contributes to existing empirical scholarship of music performance on the other.

The thesis consists of seven chapters. Chapter 1 discusses the background to empirical approaches to performance and Chapter 2 the method of measuring musical expression. The following four chapters present empirical findings on cello performance history: Chapter 3 explores expressivity in the reception trends of cello recordings; Chapter 4 the performance trends of Brahms; Chapter 5 the performance style of Casals' Bach, and Chapter 6 the artistic innovations of Rostropovich's Prokofiev. In conclusion, Chapter 7 summarises musical expression in cello performances on record based on the empirical results discussed in the previous chapters.

Empirical approaches to musical expression in performance provide an important starting point to the thesis. By reviewing previous relevant studies in the field, Chapter 1 discusses the pros and cons of previous studies and clarifies how previous empirical approaches have been influential and developed in the current research. An empirical perspective of situating musicology and performance in writing the thesis is identified. I also discuss how the present study contributes to the existing empirical scholarship of music performance by considering the hypothesis testing approaches of statistical predictions about musical expression in performance and previous empirical studies concerning cello playing. Having reviewed previous quantitative approaches to recordings that mainly concern phrasing strategies, I argue for the necessity to consider the pedagogical influence on performing trends. I also consider how the performance aesthetic of artists could be conceptualised empirically by reviewing previous studies combining ethnographic and

statistical approaches. The objectives of the thesis are addressed in the concluding part of the chapter.

Given that the measurement method of musical expression plays a crucial role in the entire investigation (i.e. empirical findings on cello performing history presented in Chapters 4 to 6 are based on the precise measurement of musical expression), Chapter 2 introduces the quantitative method. I consider the advantages and disadvantages of the measurement approach to musical expression, the ways in which shortcomings could be overcome and its reliability in terms of representing human auditory perception. I explain the measurement processes of various expressive parameters, such as timing and dynamics, and vibrato and portamento using digital applications. Discussions also include the accuracy of acoustic analysis itself and in relation to psychoacoustics (i.e. human hearing perception). I introduce how some basic statistical approaches are used to organise the measured data and also the statistical modelling method.

Chapter 3 considers how the study of record reviews could play an integrated role in the empirical investigations of cello performance practice, focusing on the reception of recordings, with particular reference to works by Brahms, J.S.Bach and Prokofiev. The study will reveal ways in which the focus of record reviews in relation to the chosen repertoires changes over the course of the 20th century.

Chapter 4 aims to identify trends in musical expression in the performance of the Brahms cello sonatas on record. A quantitative analysis of musical expression is investigated in twenty five selected recordings of the two sonatas. With the availability of multiple renditions by the same artists, this study will also attempt to pinpoint how the style of individual artists may remain or change, in addition to identifying whether similarities in pedagogical and/or national style may exist.

Chapters 5 and 6 consider the artistic styles of the two cellists, who are also known for bestriding 20th century cello playing, the earlier half by Casals and the second half largely by Rostropovich.[4]. Given his achievement of establishing the Bach cello suites as a concert repertoire (Casals 1932), Casals' philosophy of performing Bach is investigated with reference to his own recorded performances. Considering Rostropovich's collaborative involvement in the process of composing Prokofiev's cello music and the availability of the cellist's two renditions of Prokofiev's cello sonata, the artistic innovations of Rostropovich's

[4] Tully Potter comments that "Cello playing in the 20th century was dominated by two outsize personalities. If the first half belonged to Pablo Casals, the second half was bestridden by Mstislav Rostropovich, who has died aged 80" in her obituary to Rostropovich in April 2007, published in *The Guardian*. http://www.guardian.co.uk/music/2007/apr/27/russia.world

Prokofiev are examined.

Chapter 5 intends to discover the artistic style of the cellist Pablo Casals performing Bach. Expressive timing, dynamics shaping, vibrato and portamento in Casals' 1936 recording of the selected three movements from J.S.Bach's solo cello suite BWV1007 are empirically analysed, often in relation to the cellist's performance aesthetics expressed in published interviews about musical expression and/or his unreleased footage of 1954.

Chapter 6 discusses the artistic innovations of the cellist Mstislav Rostropovich in performing Prokofiev, with whom the cellist played a major collaborative role in the compositional process. Musical expression in Rostropovich's two renditions of the second movement of Prokofiev's cello sonata op.119 are empirically analysed and compared with two other selected recordings. Given the cellist's involvement in the completion of the current format, the shape of the four available renditions of Prokofiev's "unfinished" solo cello sonata op.134 (which Rostropovich never recorded) is also considered.

The thesis is concluded in Chapter 7, which considers how the objectives have been met in the empirical findings and what kinds of important performance issues have emerged from the original findings. The conclusion summarises the empirical findings on styles including trends and individualities in musical expression in 20th century cello playing on record.

Chapter 1

Background to Musical Expression in Performance and Empirical Approaches

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Considering Chapter 1 as the prologue to the thesis, I discuss what approach I intend to take over both conceptually and methodologically from reviewing previous studies. I also address what contexts these studies offer to my investigation of expression in cello performance and what kinds of predictions could be anticipated.

1.1. Performance as research

During the past two decades, music performance has received notable scholarly attention as a research topic: performance provides a variety of possibilities to enjoy the same musical work constantly, because no two renditions of a musical work can be identical. Amongst many different formats of music performance archived on record, commercial issues of recordings[5] have been accepted as one of the crucial resources of musicology research, partly because performances in commercial recordings reflect "instrumental skill and interpretative insight at the highest level" (Repp 1990: 623), whilst performance history on record[6] can be written and/or re-written.

One of the crucial publications in the performance studies field during the past two decades is *The Practice of Performance*[7] (first published in 1995, edited by John Rink) which comprises twelve articles concerning musicological and psychological approaches to performance. Another significant development of the field would be articles demonstrating the use of quantitative data[8] (e.g. Bowen 1996; Repp 1990) in performance research. More recently, owing to the establishment of the AHRC funded Research Centre for History of Analysis of Recorded Music (CHARM) and the affiliated four research projects of CHARM, performance archived on record has received much scholarly interest as a topic. Recent movement is the method of doing performance research arising from empirical musicology, which derives from the recent publication of the edited volume *Empirical Musicology: Aims, Methods, Prospects* (2004) and the new online journal *Empirical Musicology Review* in January 2006. The work presented in this thesis has been influenced a great deal by the work carried out by the Centre for History of Analysis of Recorded Music, in addition to the fields of Empirical Musicology. I discuss what I take over conceptually and methodologically learning from previous studies and what kind of predictions I could draw based on the context that these studies offer to my investigation of expression in cello performances.

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[5] For the Problem of CD transfers, see Daniel Leech-Wilkinson, *The Changing Sound of Music: Approaches to Studying Recorded Musical Performance* (London: CHARM, 2009), chapter 3.6, paragraph 91, www.charm.kcl.ac.uk/studies/chapters/chap1.html.

[6] Stephen Cottrell considers writing about historical recordings as "mediation between self and other" (2005: 8). Note that the main point of Cottrell's paper, however, is that self and other in historical performance tradition on record could be demonstrated more effectively through the actual performance rather than the writing.

[7] Although the pioneering step might inevitably have been made by Carl Seashore's *Objective Analysis of Musical Performance* published in 1936, it can be suggested that *The Practice of Performance: Studies in Musical Interpretation* is a landmark of the consideration of musical performance as a research topic and commercial recordings as source materials. Later in the current chapter, Ronald Woodley's analytical account of Prokofiev's F major violin sonata from the volume is discussed.

[8] Bruno Repp's (1990, 1998) and José Bowen's (1996, 1999) pioneering investigations into recordings through the measurement of musical expression offer useful insights into how quantitative approaches can lead to the understanding of musical expression in performance in relation to musical structure and/or in the context of performance practice on record.

One problem of performance studies could be that although scholarly perspectives favouring the academic standpoint of theoretical and historical concepts to inspire performance as a practical activity [9] might eventually have declined, a musicological tendency[10] of preferring text to sound remains in performance studies. By the musicological tendency of preferring text, I mean music's theoretical concerns of how the composer's score could be interpreted and music's historical attention to text-based source materials existing around the composer. In other words, the purpose of referring to performance (music as sound) is merely to highlight the significance of the academic standpoint rather than to discuss the actual performance as scholarly discourse. At this point, from a discussion of selected previous studies of music archived on sound recordings, I consider why a text-oriented tendency of performance studies could be viewed as problematic. I also introduce the extent to which the relationship between musicology and performance is considered in this thesis, which leads to a discussion of why an empirical perspective is useful for studying performance.

- **Analytical readings of performance**

Music theorists use recorded music to illustrate their analytical reading of the specific features of composition (e.g. Woodley 1995). Thus, although various sound recordings might be considered in the analytical writings of music, deriving interpretative ideas of recorded renditions often becomes of secondary significance to the analytical insights of musical work.

Ronald Woodley's[11] (1995) study tackles issues in the structural irony of Prokofiev's op.80 violin sonata in the context of performance practice archived on sound recordings, which provides a good example of Prokofiev performance[12] scholarship. Woodley's main concern is the "struggle" within op.80's structure and therefore he traces the structural

[9] Asking performers to mediate between musicology and performance according to the academic standpoint, a viewpoint of "gap" to be filled in between musicology and performance, is problematic because mediating between the two disciplines is also practically difficult to achieve. Given that performing musicians are a "famously hard-nosed lot when it comes to being told" (Dreyfus 1997: 171), Dreyfus takes the view that it is complicated for musicologists to inspire the decision processes and artistic judgement of performers.

[10] Nicholas Cook (1999b) believes that the etymological origin of musicology derives from such a tendency.

[11] Woodley's (1995) approach appears similar to John Rink's (1997) *Chopin Piano Concertos* and Joel Lester's (1999) *Style, Structure and Performance of Bach's Solo Violin Works*, as the author's analytical insights into the work's structure and performance experience of the pieces appear to be the main basis of the studies. Rink (1997) considers formal analysis by examining the form, tonal plan and narrative of Chopin's piano concertos. Lester (1999) focuses on analytical insights into motivic relations and characteristics of individual movements in Bach's G minor solo violin sonata, such as the Adagio's rhetorical shape and parallelism in the Siciliana.

[12] See my conference report on Alexander Ivashkin's paper 'Cooling the Volcano: Cello Concerto, Op. 58 and Symphony-Concerto, Op. 125' from the Prokofiev Discovery Day on 25 March 2006, published in Goldsmiths' Department of Music, Research News 2005-06, No.3.

"irony" through his study of the tonality, rhythm, meter and timbre of the sonata. He examines how performers "should" approach the so-called "ironic layers" (p.171) of Prokofiev's op.80 violin sonata by drawing upon the comparison between his performance experience of the sonata and various recorded interpretations. On many occasions, Woodley discusses how performers "should" situate themselves in relation both to the compositional structure and the listener's experience, which suggests the structuralist concept [13] of performing interpretation. Given that performance is evaluated according to Woodley's analytical reading of the score, the author provides little information on how the various renditions represent Prokofiev's so-called structural irony. The lack of discussion on the twentieth-century performance practice on record of the repertoire could have derived from his analytical perspective that considers performance to be of secondary significance to the analytical insights of the author into the musical work.

- **Source materials of Joachim, Brahms and Moser**

In historical musicology, although performance practice on record might seem to be discussed at length, sound recordings are used merely to demonstrate the description of source studies (e.g. Brown 2003).

Clive Brown's (2003) study of Joachim's violin playing considers correspondence between the violinist and the composer by letter, which shows the collaboration between Joachim and Brahms. Based on the suggestions of techniques, fingering and bowing in the Moser *Violinschule* [14] (1905), Brown compares the supposed writings by Joachim on performance and his actual violin playing on record. Brown's lengthy discussions on the *Violinschule* might help readers to understand Joachim's performing philosophy at a deeper level, but it can also be regarded as an example of the musicological tendency of preferring text against sound evidence. That is, a description of Joachim's vibrato, portamento, bowstroke and ornamentation in the actual recorded performances is often considered by Brown to be of secondary significance to the evidence in Joachim's editions or the writings in the *Violinschule*. In the portamento case study, for instance, Brown suggests that Joachim's portamento technique is characterised by continuous bowing pressure and slow left-hand shifting, which is considered "old-fashioned" by modern standards. Brown also points out that portamenti in Joachim's performance of Brahms' Hungarian Dances mostly occur in

[13] The structuralist concept indicates a music theorist's perception of a musical work rather than the composer's intention of the work.

[14] Brown later admits that Joachim's close colleague, Moser, undertook most of the writing.

lyrical passages, and conform to the fingerings indicated in his own edition (p.79). However challenging a guide to Joachim's techniques it is, Brown's study could be suggested to be limited in the context of representing performance because the actual performances by Joachim were to become of secondary significance to the text-based materials.

- **Early-recorded performance styles on record**

Studies of early recorded performance styles (e.g. Philip 1992, 2004) seek to understand expressivity in music as performed in history. In that sense, Robert Philip's studies of early-recorded performance styles provide the significant historical evidence of performance style in the period 1920-1950.

A limitation of Philip's studies, however, could be identified as its methodology. Given that his performance evaluation was exclusively dependent on subjective listening experience and few details, José Bowen considers that Philip's study merely provides "no further than general observations" (Bowen 1999: 430). Another problem in Philip's studies in my view is an unbalanced comparability. That is, in spite of exclusively depending on a subjective performance evaluation, his claim of early-recorded styles could have been stronger if his comparison consisted of similar quantities of early-recorded materials and modern ones. In Philip's studies, the post-WW2 performance styles are considered as mere "relative" material to highlight the significance of early-recorded ones rather than of value in their own right. For instance, his evaluation of tempo changes in bar 91 of the first movement of Beethoven's Kreutzer sonata (Philip 1992: 18) is based on nine pre-WW2 and three post-WW2 recordings, which implies his viewpoint about post-WW2 tempo could be suggested as being rather inconclusive. A similar example can be seen in his remark on the "improvisational" (Philip 1992: 92-3) quality of early twentieth-century rhythm, an evaluation which is based exclusively on early-recorded materials rather than taking a comparative approach between early recorded and modern rhythms. As will be shown in the current investigation, characteristic early-recorded rhythmic styles, i.e. the so-called "improvisational" qualities, are often witnessed in some recently recorded performances. Thus, it appears unfair to conclude that modern rhythm loses "rhetorical unpredictability" (p. 93) with such a lack of evidence.[15]

An inconsistent choice of comparison materials also appears as problematic, such as Casals' 1936 recording (Philip 1992: 65) of the Sarabande and Gavotte of J.S.Bach's cello

[15] Bowen (1999) argues that with few other recordings to compare the styles with, Philip's studies concern generalities and often ignore individual styles beyond these generalities.

suite in D being compared with other early-recorded violinists performing Bach rather than other cellists performing the same repertoire. Considering the limitations of Philip's studies, Bowen seeks the necessity of empirical methods that guide one to discover the objective correlates of what is a generally perceived phenomenon (p. 431). To this, I add that gaining an empirical perspective in comparing one performance to another is crucial, in addition to applying a measurement method.

- **Performance as research**

The selected studies for discussion have made significant contributions to the scholarship of music performance. Woodley's (1995) and Brown's (2003) studies, however, refer to performances merely to specify their academic standpoints and/or to demonstrate the superiority of their scholarly works rather than considering performance as equally significant discourses of scholarly discussion. In contrast, in spite of some methodological limitations, performance is considered as the main discourse in Philip's (1992, 2004) studies of early-recorded performance styles.

This study builds from the same conceptual discourse of Philip's studies, and considers musical expression in performance as drawing attention to the performer as a re-creator of the musical work.[16]

Bowen (1999: 432) claims that musicological reservations are largely based on the nature of two contrasting approaches; that is, whilst subjective evaluation offers mere opinion without proof, objective numerical data offer evidence of no explicitly musical nature. I intend to point out later why it is necessary to adopt the combined approaches of subjective evaluation (e.g. Philip 1992) and objective numerical data (e.g. Repp 1998) in spite of musicological reservations. Performance on record allows researchers to investigate the artistic achievement of the finished product, which the current study proposes to approach from an empirical perspective, combining detailed measured data with a critical insight into interpretation. Through an empirical analysis of musical performance, performers' perception (or "versions") of musical works can be revealed, which the present study will showcase. By adopting systematic methods of precise measurement of musical expression in the actual investigation, this thesis attempts a better understanding of the ways in which cello performance is structured through history.

[16] José Bowen asserts that performance mediates between "tradition and innovation" (1999: 427). By tradition, he means the identity of work perceived through the history of remembered innovation and by innovation the performer's input.

1.2. Empirical musicology

I mentioned earlier that empirical musicology is one of the recent movements in performance research. But what is empirical musicology and how is it related to the current study? During the past two decades, growing scholarly interest has been shown in scientifically inspired music research, called empirical musicology. This chapter indicates how the present study contributes to the existing empirical scholarship of music performance through a background study of previous approaches concerning performance practice on record, and the measurement of musical expression.

Henkjan Honing (2006) considers empirical enthusiasm in music research as a return of systematic musicology,[17] which contrasts with Nicholas Cook's (2006) view that in spite of the distinct characteristics of cultural musicology and systematic musicology, empirical methods are potentially valuable to both. Cook and Clarke (2004) suggest that any musicological research, to a certain extent, is "empirical" because musicological discourse is based on empirical observation and discourse itself often in turn adjusts the observation and they therefore find it complicated to define what non-empirical musicology is. To Honing (2006), one of the challenges of empirical musicology is to discuss the ways in which empirical methods contribute to the understanding of music as a phenomenon and indicate how the understanding has an effect on musicological discourse.

I suggest that the aim of empirical musicology is to demonstrate how systematically rigorous methods and findings of data-oriented investigations could guide one towards a better understanding of performance practice on record. Besides, based on empirically tested, relatively large sets of data, the current study concerning an empirical approach to musical expression in cello playing on record brings a necessary level of objectivity to musicology.

One of the most significant influences of empiricism in empirical musicology is found in performance research. The study of empirical approaches to performance is often confused with the psychology of performance, because not only can the recent development of empirical methodology be traced back to the pioneering studies of Seashore[18] and other 1930s' psychologists, but systematic investigation into performance can also be seen as disciplinary differences between musicology and psychology. In the article entitled

[17] Systematic musicologists categorise historical musicology, ethnomusicology and systematic musicology in a clear cut way. For instance, Richard Parncutt (2007) considers that historical musicology and ethnomusicology could be regarded as the bottom-up components of musicology, focusing on specific manifestations of music, whilst systematic musicology is the top-down component focusing on music as a phenomenon.

[18] As early as 1936, Carl Seashore published a volume of collected essays entitled *Objective Analysis of Musical Performance*.

"On music performance, theories, measurement and diversity", Timmers and Honing (2002), however, argued that empirical approaches are crucial to studies in "musicology, music psychology and music performance practice" (p.2).

Timmers and Honing (2002) provided a thorough guide to empirical musicology of performance research by addressing the "definition and measurement of expressive timing" and also discussed the "interpretation of expressive patterns" (p.2). In their discussion of defining expression, Timmers and Honing (2002) categorised expression into three kinds: (1) microstructure, (2) deviation from a musical score and (3) deviation within a performance. By the "microstructure", Timmers and Honing (2002: 4) suggested that "expression completes what the score leaves unspecified" and as for the examples, they indicated Repp's 1990 and 1992a studies. According to Timmers and Honing, the definition of "deviations in the performance data from a mechanical rendition of a score" (2002: 5) derives from Seashore (1938) and Gabrielsson (1974; 1987), in that "performances of rhythm are characterized by deviations from the norm as stated by the musical notation". By the deviation within a performance, Timmers and Honing introduced Desain and Honing's (1991) elaboration on the definition of expression "as deviation from a norm" (2002: 5) by defining the norm within the performance: their suggestion is that "the expressive variations of the durations of beats is expressed as ratios of the bar duration" (Ibid.).

Timmers and Honing (2002) compared these viewpoints on expression by analysing expressive timing using these definitions. In the case of *microstructure*, the IOIs are corrected for their score duration by dividing each note IOI by its corresponding score interval (p.8) or by calculating IOIs at a certain metrical level, or the bar level (p.10). *Deviation from the norm given by the score* can be represented as percentages (or fractions) below and above the mean (p.13) of which a re-scaling of the normalized IOIs are required. They reported that the resulting timing patterns are identical to the pattern according to the microstructure definition (p.13). In the *deviation from a norm within the performance* representation, the timing pattern shows for each score eighth note the measured beat IOI as a fraction of the measured bar IOI (pp.13-14). Timmers and Honing summarised that what matters is at which structural level expressive timing is examined. Note onset IOI is accurate at showing rubato and small sub-beat level, but not as accurate at global trends. The beat-level IOI is competent at showing both global trends and local variations. Deviation from a mean IOI might also be crucial, but not as meaningful because mean IOI is unsuitable as a reference (p.15).

Timmers and Honing (2002) provided helpful insights into previous approaches to measurement of expression with reference to what extent the act of performance explains expressive variation (p.16). They explained that Clarke's (1988) generative theory of expression means generating expressive variations, whose expression serves to highlight musical structure (p.17), whereas the structural expression component theory (SECT) (Desain and Honing 1997) is based on the observation that generative models of expressive timing formalize a relation between expression and one specific kind of structure (pp.17-18). Penel & Drake (1999) separated the sources of expression by way of an experimental paradigm, where the musician was instructed three conditions including (1) strict in tempo, (2) in a mechanical way, without expression, and (3) finally, with expression (p.18). Timmers and Honing also suggested that the distinction between variations due to expressive intention on the one hand and those due to motor noise and perceptual bias on the other hand may seem evident at first sight, but this is not made explicit by all expressive performance researchers (p.19). They also reported on Windsor, Aarts, Desain & Timmers' (2001) discovery that it is very likely that the encoding of movements (of the performer or otherwise) also attribute to the expressiveness of a performance (p.19). Timmers and Honing (2002) suggested that even if the distinctions between the intentional, motoric and perceptual cannot be drawn so sharply, they are nevertheless useful concepts (p.19). Timmers et al. (2000) also showed that although pianists may agree on a certain interpretation of the musical structure, they show clear differences in their use of tempo rubato. An additional perceptual study (Timmers 2002) showed the importance of the global features of a performance as rubato extent, average articulation, use of dynamic shaping and use of asynchrony in characterizing a pianist's interpretation (pp.21-22).

Timmers and Honing (2002) pointed out several approaches towards diversity in performance literature, which they categorised into four different kinds. These were 1) studies that consider a small number of performances of a piece of music (see Clarke, 1995; Desain & Honing, 1994; Palmer, 1996a), which suggest that relationships within a single performance are important, meaningful and specialised. 2) Studies that classify performances into groups, typically in the lines of gender, age and experience, whose similar characteristics and measurements are averaged (p.24). 3) Analyses that concern several performances of a single piece, such as Repp's (1992a) use of a grand average timing profile (i.e. measured note IOI patterns of hundreds of performances) that contains common timing characteristics. 4) Common and distinct features of different performances

can be tracked by a principal components analysis [PCA], whose expressive shapes are described by mathematical functions with adjustable variables (for both methods, see Repp, 1992a). Timmers and Honing (2002) concluded that the variety in performances of musical pieces raises the question of meaningful differences and similarities between performances and the relevant relationship between performance characteristics and musical structure. The conceptual standpoint of this article lies in the same ground as the present study. Methodologically, an empirical investigation of Brahms cello sonatas on record can be categorised concerning several performances of a single piece, such as Repp's (1992a) use of a grand average timing profile (i.e. measured note IOI patterns of hundreds of performances), whereas only a small number of Bach and Prokofiev performances are considered (see Clarke, 1995; Desain & Honing, 1994; Palmer, 1996a), which suggests that relationships within a single performance are also meaningful.

- **Statistical models in the measurement of musical expression**

Due to their quantitative nature, empirical approaches to the measurement of musical expression in performance are often considered together with statistical predictions. Given that pedagogical influence on the performing trends of Brahms' cello sonatas (findings reported in Chapter 4) is based on statistical prediction (introduced in Chapter 2), I review four relevant empirical approaches to testing hypotheses about musical expression in performance.

A hypothesis about music performance, proposed by the researcher, is often tested for empirical validity; one common approach of the expressive performance algorithm is investigated through comparison between human and algorithmic performances. One example can be found in investigations by Luke Windsor and Eric Clarke (1997; Clarke and Windsor 2000) using Neil Todd's (1992) algorithm. Todd's (1992) computational algorithm for predicting a dynamic profile in artificial performances complements his 1985 timing algorithm, which is based on the assumption that expressive timing and dynamics in performance are related to prolonged structure. Motor action in performance means that accelerando and crescendo occur simultaneously, as with diminuendo and ritardando, particularly in certain interpretative styles of the Classical and Romantic repertoire. Windsor and Clarke's investigations into Todd's model of performance (1992) reveal that the predictions of Todd's algorithms for timing and dynamics in performance do not correlate with those observed in expert human performances of Schubert's Gb major Impromptu op.90 renditions (Windsor and Clarke 1997) and the theme of the first movement from Mozart's

piano sonata in A major K.331 (Clarke and Windsor 2000). Windsor and Clarke's studies provide a useful starting point for Todd's prediction through the most direct approach to testing the computational algorithm for performance.

Todd's motor action has also been tested in the quantitative investigation of commercially recorded performances: Repp's investigations into piano performances and my own empirical analyses of cello performances. Repp (1999c) considers Todd's algorithm against the 115 existing commercially recorded performances of the first five bars of Chopin's Etude in E major, which reveals that pianists' "independent control" over expressive timing and dynamic in phrasing provides a variety of meaningful shapes of the Etude opening. Similar findings are also observed in my own previous empirical studies of 20 performances of J.S.Bach's C major Sarabande from the cello suite (Hong 2003) and two renditions by Rostropovich and Richter of the second movement of Prokofiev's cello sonata (Hong 2006b).

Another way of testing the generative model of musical expression in performance is through an empirical investigation based on the principle of reproductivity; [19] that is, the behavioural patterns of musical expression could be quantitatively investigated through the repeated takes of performances. Focusing on the three different timing profiles of the theme of Beethoven's six variations in G major WoO 70 by the same pianist, Luke Windsor et al (2006) suggest a structurally guided method for the decomposition of musical expression in performance. Desain and Honing's (1997) structural expression component theory (SECT) is empirically tested under laboratory conditions in Windsor et al's (2006) study, focusing on the temporal reaction of the same performer playing the same excerpts in three different tempo conditions. SECT (Desain and Honing 1997) is built upon the statistical assumptions of musical expression about parameter consistency from score to performance and linear tempo change. Windsor et al (2006) report phrase internal variations, such as ritardando and accelerando, and two occurrences of delayed note preceding a grace note to a downwards leap in the observed human performances of three different tempo profiles, which indicates well-correlated similarities with the statistical prediction.

Whilst the previous studies concern mostly the validity of the algorithmic models[20]

[19] Clarke (2004) claims that given that music performance is a "recreative" art, a "behavioral" scientific perspective; i.e. one that seeks an average value from a number of repeated performances, it might have little value. Note that consideration is given to the principle of reproducibility when obtaining data values of the same performance using a reverse conducting approach by calculating average timing data from three tap-along runs.

[20] Todd's computational prediction concerns the interaction of expressive timing and expressive dynamics in performance and Desain and Honing's statistical assumption considers the relationship between musical expression and musical structure.

about musical expression, the following study (Timmers 2005) considered another crucial aspect of expressive performance, investigating a hypothesis on the measurement of musical expression in relation to the auditory perception of participants. With the aim of discovering how well measured data represent the characteristics of performances and which data representation comes closest to perception, Renee Timmers (2005) reports her test of hypothesis on the measurement of musical expression (tempo and loudness) through the experimental investigations of auditory perception by *human participants*. The validity of one hypothesis was tested in two experiments, with 40 participants rating the similarity between performances of a Chopin prelude and a Mozart sonata. To compare the ability of models to explain the subjective similarity between pairs of performances, she used beat level tempo and loudness of the selected excerpts from CD recordings. According to Timmers, whether participants were musicians or non-musicians, and whether the selected excerpts played were Chopin or Mozart, participants showed some difficulties in identifying the two different ways in which tempo and loudness are shaped. The study concludes that given that the experiment on the perceived phenomenon only deals with a relative ranking of different measures, the measurement method can be suggested to reliably represent the specific character of performance. The conclusion is based on the fact that the subjective distance between performances was well predicted in the measured differences in tempo and loudness.

Timmers' (2005) findings on musical expression measurement in relation to the experiment of perceptual basis provide an empirical validity to the future studies concerning the measurement of musical expression on record, including the present study.

- **Empirical approaches to cello performances**

Partly due to the percussive character of the instrument and MIDI, which provides sharp onsets of events, piano performances have received the bulk of empirical attention in performance research on the measurement of musical expression. The cello has received some empirical attention, particularly with regard to ensemble issues during rehearsals of cello-piano duos (Goodman 2000), memorising music in solo cello performance (Williamon 1999; Williamon and Valentine 2002),[21] and the cellist as performing participant in memorising music (Chaffin et al 2010).[22]

In Elaine Goodman's (2000) empirical study of rehearsals in cello-piano duos, the

[21] Aaron Williamon (1999) observes the audience (participants in the research) reaction between the memorisation of J.S.Bach's solo cello pieces and the presence of the music stand.

[22] Tanya Lisboa (2010) participates as the second author per cellist participant in Roger Chaffin's investigation into memorising music.

expressive timing of two instrumentalists was investigated separately as well as in ensemble. Indicating how ensemble players interact in the handling of musical expression between the "solo" and "ensemble" rehearsals, Goodman's findings provide the understanding of the nature of ensemble performance. Besides, however briefly the two different participating ensembles might have been considered (Goodman 2000: 227), her discussion of the expressive timing and dynamics of Brahms' Minuet and Trio from the E minor sonata provides stimulating performance issues to compare with the renditions of the selected cellists discussed in Chapter 4. Her approach of measuring separate timing profiles, however, is only possible under the circumstance of rehearsal processes. That is, due to the rather primary status of audio source separation software,[23] obtaining the two separate timing profiles from the finished product of ensemble performance is almost impossible at present.

Goodman's (2000) studies on investigating the nature of ensemble between cello and piano has provided a significant contribution to performance scholarship in general and the reaction of the cellist(s) under laboratory conditions in particular. The current study builds on the scholarship of cello playing, focusing on musical expression in recorded cello performance through a quantitative approach, aiming to discover general trends, pedagogical traditions and artistic innovations.

[23] It is a separate matter that sound separation of two instruments from the finished product of ensemble performance could be suggested as manipulation. Source separation techniques in audio research can be used to separate sound based on different timbre; two separate sound files of cellists and pianists of ensemble performance (as the finished product) could then be obtained for a further analysis of musical expression. It was, however, identified that the status of the source separation tool is yet to be developed further in order for it to be used in the consumer-end of empirical musicology research (private communication with Michael Casey).

1.3. Empirical approaches to reception trends on record

With regard to the objectivity of reception history, one might point to the problem regarding the anonymity of music critics. Anonymity includes the difficulty of deducing the identity of the writer based on mere initials, penname (rather than real name) and possible editorial interference with the actual writing. The role of music critics is to evaluate and to report on music, whilst responding to the social background around the music at that time. Thus, the anonymity of music critics actually provides a useful source for understanding the social and cultural surroundings effectively, which can be suggested as the neutrality of listening practice through history. José Bowen (1999: 431) observes that even though music critics might primarily be making an aesthetic judgment in recording reviews, due to the confusion between the "general descriptive studies and mere CD ratings", so-called "subjective" criticism has been largely neglected by American musicology.

In contrast, Daniel Leech-Wilkinson (2009) gives credit to music critics (Gramophone reviewers) by suggesting that critics can be seen as pioneers of the study of performance on record. By arguing that it is the reader's responsibility to understand "the mechanism that connects the metaphor",[24] he even defends the ambiguity of language expression of music critics as metaphor. It is indeed true that various capacities of music critics could be identified, including those of being acquaintances of musicians, professional listeners and independent writers situated between the audience and musicians. Nevertheless, even if the intersection between performance practice history and interpretative study of hermeneutics means a study of reception history which could act a useful guide to investigating performance practice on record,[25] the fact that reception history identifies the changing views towards and/or around the specific recordings, the study of the changing attitudes of music critics would inform readers about the social historical viewpoints in listening practice.

- **Reception history of music**

In contrast to Bowen's (1999) and Leech-Wilkinson's (2009) concerns about musicological neglect of the reception of recordings, the reception history of a particular composer and/or musical work has been a well-received topic of musicology research. Pointing out the

[24] Daniel Leech-Wilkinson, *The Changing Sound of Music: Approaches to Studying Recorded Musical Performance* (London: CHARM, 2009), Chapters 1, 2 and 3. Paragraph 29. www.charm.kcl.ac.uk/studies/chapters/chap1.html). He believes that once the mechanism of connecting metaphor is learnt, this leads to the understanding of "how performances may usefully be described and compared in words alone" (Leech-Wilkinson 2009: Chapter 1.2.2. Paragraph 27).

[25] According to Bowen (1999: 446), work-specific traditions stand between period style and individual innovation in the history of performance practice on one hand and they [work-specific traditions] mediate between the reception of the work and its interpretation in the history of hermeneutics.

difficulty of researching art history, Jim Samson (2009) suggests reception history as a crucial solution to researching music history. He claims that whilst relating Beethoven "in his time" to Beethoven "for today", and studying Beethoven's *Eroica* symphony (No.3) might not be easy, Beethoven now and then makes a fascinating topic for reception history (pp.8-9). Elsewhere, Samson (1994: 12) points out that the separation of performance and text was identified through (a) editors, (b) Chopin pedagogical lineage and (c) pianists in later reception. He also discusses (p.13) differences in music criticism in Chopin's time and ours; whilst Chopin's contemporaries considered his music relating to contexts of expressing an emotion, telling a story, exemplifying a genre, articulating a style or confirming an institution, the de-contextualisation of the work plays a significant role in our time.

Given performance as a main discourse of this thesis, although the reception history of recorded music might offer a limited audience range,[26] it is nonetheless a good source of investigating the changing expectation of cultural acceptance over time. The following case study elaborates how reception history and empirical analysis of recorded music can be combined, focusing on early-recorded violinists.[27]

- **Nineteenth-century British critics on early-recorded violin playing**

Contrary to Brown's (2003) approach (discussed earlier), where the main scholarly concern was focused on text-based material by the violinist Joachim, Dorottya Fabian considers how Joachim's violin playing was received in nineteenth-century Britain, whilst often referring to the acoustic properties of the actual recordings. In other words, Fabian (2006) makes an empirical analysis of early-recorded violin playing on record in comparison to the viewpoints of nineteenth-century British music critics. She points out that the limited recording technology of early-recorded performances actually provides the present day listeners with an "unedited live-like" version, similar to the conditions in which audiences of the past would have listened. Her listening experience of recorded music is supported by two empirical methods: an investigation of the reception of nineteenth-century critics, and the use of a computer-assisted approach as spectrographic and time-series analyses. For this reason, it can be suggested that her paper makes a significant pioneering step towards relating reception history and empirical analysis in the study of recorded music. She also successfully indicates

[26] Reception history of recordings offers the view of selected panels of music critics rather than opinions of the general audience.

[27] Dorottya Fabian's (2006) study of early-recorded violin playing empirically investigates how the performance was received in the late nineteenth century referring to secondary literature.

the artistry of the selected violinists, Joachim, Ysaÿe and Sarasate, whilst providing nineteenth-century expectation and taste of violin playing and also the nature of sound recordings as evidence of performance practice. Even though her study of reception history might have depended on secondary quotes of nineteenth-century reception rather than going back to the original source, Fabian's challenging step of combining the reception history of recorded music with empirical analysis appears stimulating. From her review of reception history, she points out that by the end of the nineteenth century, the focus on composition had gradually weakened (p.195) and critics began to show some interest in the actual performances. Fabian also provides her empirical result of Ysaÿe's fast execution of the third movement of Mendelssohn, which was strongly criticised in the nineteenth century, by comparing Ysaÿe's recording with three randomly selected modern recordings. Her resulting report indicates that Ysaÿe's tempo is indeed the fastest of the three, including Szigeti's; Ysaÿe's crotchet is 189, whilst Szigeti's crotchet is 164.

Fabian's approach is not only unique in combining soft (social) and hard (physical) scientific-based methods in investigating recorded music, but also provides nineteenth-century expectation around violin playing and useful clues as to why the early-recorded violin playing style could appear peculiar to present day listeners. Her study also shows a pioneering approach of combining the history of hermeneutics with performance practice on record. Based on the findings of Fabian's studies, one can presume that a study of record reviews could provide useful insights into analysis of performance practice on record. Chapter 3 discusses how record reviews could be understood as evidence of changing focuses in music history, and why that focus changes.

1.4. Discussing performance trends on record

In the literature concerning quantitative analyses of performance trends, I have considered two different cases: one concerning composer-oriented materials, such as the composer's metronome marks, and the other examining the phrasing strategies of performances.

- **The composer's metronome marks and trends in interpreting tempo indication**

In studying performance trends on record quantitatively, a composer's metronome marks have been considered widely as some kind of starting point. Bernard Sherman (2003b) investigates Brahms' metronome marks, timings and other period evidence regarding tempo in Brahms. Although his findings do not provide any evidence regarding Brahms' words on proportional tempo between movements, the article begins with Sherman's firm belief that this is how Brahms would have wanted his works to be performed.

Sherman writes that Brahms himself was not compelled to put metronome marks on his compositions. But Brahms' own existing metronome marks were of significance to Sherman because, in his view, they often reflect the composer's concert experience prior to publication. Based on the words of performers associated with the composer (as opposed to what is documented in texts), Sherman claims that the classical fast Andante (supported by the pianists Fanny Davies and Max Born) for slow movements and slow Presto (confirmed by the violinist Franz Kneisel) for fast movements would be Brahms' idealised tempi.

The median (average) duration of each movement in the première performance and selected pre- and post-WW2 ones was investigated by Sherman using the regression technique of statistical analysis. He found a statistically significant ($p < 0.001$) positive correlation ($r = 0.75$) in median duration in the first movement of the Second Symphony according to the date of recordings: in performances recorded at later dates, the duration of the first movement was longer. Given the relevance to the title of Sherman's chapter, which focuses on the metronome marks, it would have been interesting to see if his regression analysis holds for the metronomic tempo of each performance (rather than duration of the movement) in relation to the date of recordings. His discussion on timings of performances is relatively short, although the accompanying charts help readers to have a clear frame of the performance history. Sherman's view on Brahms' performance practice in general, however, can be seen as problematic. His preconception of Brahms suggests that works should be performed as close as possible to Brahms' own performance style or performances of the composer's time. This inclination leads him to consider the timings of première and pre-WW2 performances as a norm in his statistical analysis. Sherman's approach appears to be a

useful example of studying performance tradition.

- **Phrasing strategies in quantitative analysis**

The phrasing strategies of piano performances have been a concern of empirical researchers for the past two decades or so. In some cases, the similarity rate of one performance to another is considered in conjunction with phrase arching.[28] Whether certain phrasing strategies might indicate characteristic features of a particular pedagogical group has not been considered. In this section, the pros and cons of detection of average performance features (Repp 1998) and timescape (Cook 2008; Sapp 2007) are evaluated.

Bruno Repp's (1998) studies investigate the expressive timing patterns of 115 commercially-recorded performances of the first five bars of Chopin's Etude in E major, which present a way in which performance models can be conceptualised through a bottom-up approach. Repp uses principal components analysis (PCA) to detect groups of performance features of his selected performances; in this case, four different timing profiles concerning phrase structure in the given excerpt, including executions in phrase boundary, phrase internal variation and local level. In his investigation of the same source materials, five different components of expressive dynamics are retrieved (Repp 1999a). Repp himself points out the limitations of PCA, such as the insensitivity of detecting basic tempo, relative modulation depth and the similarity of two different performances. Using PCA can be suggested as useful in detecting common features of large numbers of performances, usually relevant to score-oriented aspects such as phrasing. PCA, however, is unable to identify similarities in performance styles between two artists of the same pedagogical relationships or some other criteria or influences of reception history in performance. The crucial limitation of Repp's approach is lack of consideration of the individuality of each performance. Whilst Repp's studies consider the topic through the investigation of concert performance practice, the choice of a short excerpt from Chopin's Etude in E major provides an over-generalised conclusion, which often overlooks the significance of individual differences in performance interpretation.

Another example of comparing one performance to another by statistical means can be found in a computational musicology project focusing on commercially recorded Mazurka

[28] Empirical researchers consider the internal variation of phrase as the shape of arch, being associated with eventual crescendo and diminuendo in dynamics and becoming faster and slowing down in timing in performance.

performances under the auspices of the CHARM project.[29] Sapp has also developed a multicoloured pyramid-shaped "scape" plot to illustrate the correlation of timing and dynamics. However visually extravagant "timescapes" and "dynascape" might be, the pyramid shape and colour codes of scape plots does not provide any further logic beyond a conventional correlation scatter plot or the numbers which belong to them.

- **Pedagogical tradition**

Leech-Wilkinson (2009) discussed cases of Clara Schumann's pupils playing is rather doubtful to reconstruct the teacher's playing style based on pupils' performances on record in the absence of visual evidence or reliable and clear testimony.[30] Leech-Wilkinson's point of what one teaches could not always be perfectly synchronised to what musicians do in their own execution is indeed true and I share the same view as him in that such reconstruction of performance style is a rather dubious exercise. However, provided that recorded evidence of both teacher and pupils were to survive, figuring out whether pedagogical heritage exists in pupils' playing styles appears a useful research question in performance practice on record. Recent studies investigated pedagogical traditions in pianists (Cook 2009a, 2009 b, 2009c) and string quartets (Turner 2004) using meticulous scientific and statistical analysis. Sapp's approach is a correlation-based pyramid shaped scape on timing as well as dynamics, whereas Turner uses time clustering analysis.

Richard Turner (2004) made a useful case on grouping direct comparisons between different string quartets on a national and geographical basis, which often included investigation into pedagogical heritage in performance. Nicholas Cook (2009a: 235-236), however, criticised the fact that by reducing the temporal evolution of the music to a single value, Turner's clustering analysis says little about performance style. Cook remarked that although Craig Sapp's visualisations (see the Mazurka website) could be seen limited in a sense that they are based on the overall tempo profile without any attempt to distinguish the different features, Sapp's approaches focus on style, in the sense that they are based wholly on comparison, and are resolutely bottom-up. Leech-Wilkinson (2009) found that Sapp's hierarchical correlation plots show particularly clearly in tempo graphs, but are less immediately apparent in similarities.[31] I also share Cook's views that Sapp's approach to comparison indicates performance style efficiently, including the same performer as well as

[29] CHARM stands for the AHRC Research Centre for the History and Analysis of Recorded Music. The Mazurka project is conducted by Nicholas Cook, Craig Sapp and Andrew Earis.
[30] Chapter 6, paragraph 7.
[31] Chapter 6, paragraph 51

pedagogically related performers.

Leech-Wilkinson (2009) described typical aspects that piano pupils learn from teachers, including ways of holding the hand, fingerings and solutions to specific technical problems, which are more easily seen than heard.[32] Fingering and bowing are crucial aspects for string players to consider in lessons and in rehearsals. Thinking back to my music college years, one of our lesson preparations involved copying out the teacher's fingerings and bowings in the students' common room, whereas half of the rehearsal time was spent on discussing bowing between string players. Given that decisions on fingering and bowing would mostly result from instructions from the of teacher in lessons on the principal instrument, whereas instead of negotiating between players in chamber music rehearsals, more clear indication of pedagogical traditions would be shown in the study of solo performance practice than chamber music practice such as string quartets. String players consider the perception of music's phrasing in the planning stage of fingering and bowing whilst consideration into one's own pedagogical tradition is always taken into account at conscious or sub-conscious levels. Given that portamento and vibrato in string playing are caused by a combination of aspects including fingering (on how the performer shifts from one position to another and on vibrating the left hand) and phrasing with bow division and strokes, an empirical investigation into musical expression could guide a discovery of the pedagogical heritage of cello performance practice on record.

[32] Chapter 6, paragraph 7

1.5. Towards the discovery of performance style

Empirical approaches can further be divided into a combination of ethnographic and measurement approaches (e.g. Clarke et al 2005; Cook 2005a; Timmers and Desain 2000) and/or interpretative insights supported by measurement (e.g. Leech-Wilkinson 2011). Given that this study uses both approaches respectively, Chapter 5 through a measurement referring to the published interview and in Chapter 6 measurement is explained by an interpretative insight, I discuss previous relevant studies.

- **Combination of ethnographic and statistical methods in the investigation of contemporary performance practice**

A joint study by Eric Clarke, Nicholas Cook, Bryn Harrison and Philip Thomas on interpretation and performance in Bryn Harrison's work *être-temps* reports some useful findings, and demonstrates a successful combination of two different methods. A jointly authored article in *Musicae Scientiae* (Clarke et al 2005) and a single authored article by Cook on the same case study in *Music Theory Online* (2005a) are evaluated here.

One can assume that Clarke's main concern with past empirical studies of performance would have prompted him to adopt the new method. That is, there are limitations of the artificial sense of "laboratory" conditioned [33] performance that have previously received some criticisms, and investigating commercial recordings as performance appears problematic to Clarke, because it only represents a "carefully controlled final state of interpretative activity" (pp.31-32) with no information provided on its process. Clarke et al's investigations were focused on the interpretation process in terms of (1) rehearsals and performance and (2) interviews with the composer and the performer. The composer does not want to become involved in the process of interpretative activity, but perhaps owing to the experience of previous collaboration between the two artists, the areas of concern to Harrison, the musical materials, precision in tempo and metric and rhythmic notations become musical and practical concerns for Thomas in the learning process. Thomas seems to have strong post-Cageian viewpoints in general and on *être-temps* in particular, in that one should pay more attention to the gestural details of the section itself rather than the relationships between sections, formal shape and linear progression.

Cook deduces that the score acts as a "surrogate" between the composer and performer, and therefore music is "notation *and* sound *and* human action" (p.46). Elsewhere,

[33] I have written elsewhere about the limitations of the artificial sense of "laboratory" conditioned MIDI performance, which in many ways differs from real performance (see Hong 2006).

he points out that by involving an ethnographic method, which shows that the voice of the performer, which had been considered of secondary significance to the voices of composers and theorists, was now heard (p.7). Huovinen (2006) is hesitant about taking ethnographic data as empirical observation, because he perceives that there is a blurring of the line between the experiences of informant and researcher in the ethnographic interview data. Stock (2004) also notes that even if the content may indicate the same thing, it is certainly true that the informant's responses tend to follow the "lead" of the interviewer/researcher in ethnographic data collection, which is a standard problem in this kind of investigation. It is indeed true that the collection process of qualitative data cannot be as objective as the ways in which quantitative data is measured, but the findings of qualitative analysis can provide a useful starting point or hypothesis of the quantitative method, as can be seen from Clarke's analysis. His emphasis on performers' words can be shown in the process of his interpretation of data from six recordings (five rehearsals and one performance) and the score. That is, Clarke's data interpretations are closely associated with Thomas' interpretative agendas on each page of the piece, such as control of texture, timing structure and dynamic precision and rhythm and tempo. Clarke presents a correlation coefficient rate and t-test result based on the rhythmic patterns of inter-onset-intervals (IOIs) and the dynamic data are a result of his analysis of MIDI data.

The most significant finding of this investigation is that, in contrast to the general assumption, there were no substantial changes in the performer's interpretative ideas during the rehearsal process. Indeed, as Clarke suggests, this might be something to do with either the interpretative ideas already being established in the first rehearsal or with the fact that some changes might not have been detected by the MIDI system and analysis method. His former speculation appears more convincing, since rehearsal and interpretative processes vary from one performer to another, and also substantial changes during rehearsals are more common in ensemble than in solo performance. It can be seen that this study overcomes the limitations of the artificial sense of laboratory-conditioned performance by investigating the correlation between rehearsals and public performance, although any modifications in the performer's reaction between the MIDI piano and concert piano[34] remain to be seen.

By combining quantitative and ethnographic methods, the study shows another

[34] Additionally, performers' reactions to the MIDI-piano may differ to their reaction on the concert piano. As a consequence, I suspect that if the investigation were to use a concert piano in a real performance situation, that is, concert hall and/or recording studio, different outcomes may emerge. Dunsby, who was a participating pianist in Clarke's (1995) investigation, supports this view: 'there may have been a self-conscious attitude in some aspects of the interpretation' and recording situation (Dunsby 1995: 69).

pioneering domain for performance studies. A similar way of combining qualitative and quantitative approaches to performance is taken into account in the current investigation, with the aim of discovering the individual innovations of cello playing on record. In Chapter 5, the cellist Casals' thoughts on musical expression, such as expressive timing, expressive dynamics, vibrato and portamento are investigated by re-evaluating the previously published interviews and empirically analysing commercially recorded performances. Chapter 6, on Rostropovich's Prokofiev, considers his performance style in relation to his collaborative involvement in the compositional process.

- **Vibrato on record**

With regard to violin vibrato, whilst Mark Katz (2004) addresses the influence of sound recording on musical culture, including what part phonography played in the fashionable rise of violin vibrato in the early twentieth century, David Milsom (2003) suggests long notes, fermatas and accentual vibrato as the typical location of early-recorded violin vibrato. Dorottya Fabian's (2009) investigation of the use of vibrato in selected violinists recorded between the 1970s and the 2000s reveals the varieties of vibrato rate (cycle per second), width (in semitones) and frequency (the occurrence of vibrato) and also points out a decreasing use of vibrato in the case of Kremer between 1980 and 2005. In contrast to many discussions on violin vibrato recorded in both pre- and post-WW2 eras, cello vibrato has received little attention.

Renee Timmers and Peter Desain's (2000) experimental investigation discusses cello vibrato in a comparison between interviews with musicians and the results of acoustic analysis. Their acoustic analysis of vibrato in performing the first phrase of 'Le Cygne' (The Swan by Saint-Saëns) suggests that the effect of metrical stress and phrase position on vibrato rate is significant for the cello, but less on the melodic charge. Likewise, the effect of metrical structure and phrase position on vibrato extent is also significant for the cello and the effect of metre and phrase on mean amplitude of notes is also strong on the cello. Overall, not every clear analytical result is remarked by musicians and likewise, not every comment on vibrato is confirmed in the analysis. Timmers and Desain suggest the reasons derive from musicians' tendency to talk about expressive aspects in a sequential way and the contrasting perspectives of vibrato application between scientists and musicians. Despite the fact that vibrato might have been considered exclusively in performances in the laboratory conditions, the study shows a pioneering step towards how ethnographic and measurement data could be combined. In Chapter 5, concerning the performance aesthetics of Casals's Bach, a similar

approach is adopted in the context of performance practice on record, using a commercial re-issue of the recording and a published interview.

- **Portamento on record**

In spite of being a characteristic time-domain dimension in musical performance, there has been little empirical attention towards the measurement of portamento. That is, previous studies on portamento in performance have been discussed exclusively through subjective approaches.

Historical musicologists consider whether the reason for the decline and revival of portamento could be related to the recording industry and/or interaction with another expressive parameter, such as vibrato. Mark Katz (2006) finds the reason for the decline of violin portamento and continuous vibrato is the "phonograph effect", which suggests the influence of recording technology on violin techniques. Katz, nevertheless, was uncertain about the reason for the selective revival of portamento in the 1980s. According to Leech-Wilkinson (2006), the gradual decline of portamento had become evident after WW1 and it had disappeared by WW2. He also regards the time that vibrato became noticeable (wide and slow) is approximately the same as the beginning of the slow decline of portamento in the 1910s and 20s.

Given that the portamenti occurrence rate was only briefly discussed in relation to vibrato in Arnold Small's (1936) pioneering analysis of violin recordings, the relationship between portamento and vibrato has been of scholarly interest. Small's (1936) discovery of Menuhin's portamento mostly containing vibrato (40%) is stimulating, because it is the characteristic of the violinist's portamento, to which nonetheless music listeners would not pay much attention. Furthermore, he also confirms that Menuhin uses portamento rarely (a few times in the performance of Ravel's Tzigane) even in the pre-WW2 era, which contradicts the general assumption that portamento was a widely used expressive device in the pre-WW2 era. It can, however, be suggested that in contrast to Small's thorough investigation into tempo and vibrato, empirical consideration into portamento appears relatively overlooked.

With regard to portamenti in early-recorded cello playing, Robert Philip (1992) considers Feuermann's and Casals' portamenti as the "new-age" portamento of the early-recorded cellists; the heavy slide from one position to another, a feature of the early twentieth century, gradually became a thing of the past. The portamento of Feuermann's contemporary, Piatigorsky, has hardly been mentioned in any previous studies. Schoenberg particularly

admired Casals' avoidance of sentimental portamento: "And when the occasional portamento does occur, it is only to lend a lyrical *dolce* passage, the tender colouring that expresses the mood of such a passage all the more piercingly" (1923 [1975]: 346).

Leech-Wilkinson (2006: 237) categorises three different types of vocal glide depending on their speed and their independence of gesture, namely swoops (quick shifting), glissandi (which is an independent gesture itself) and portamenti. Cello glides mostly fall into Leech-Wilkinson's category of portamento, a way of making expressive moves from one pitch to another. The most frequently discussed string portamento (Milsom 2000; Turner 2004) can be seen as two types of portamento, namely L- portamento and B- portamento, which are about the change of fingering at the occurrence of sliding. Given their association with fingering, these features can neither be recognised accurately in human listening nor can they be measured in audio recordings statistically.

- **Vibrato and portamento**

Leech-Wilkinson's aim of studying the change in violin playing styles and their relation to singing styles was investigated through vibrato and portamento on record. He provided a detailed account of how the style of violin vibrato has changed with reference to the players' date of birth and recordings of Beethoven and Brahms concertos in relation to vibrato speed and depth. Leech-Wilkinson claimed that Stern's vibrato shows a very clear link between speed, depth and expressivity of "faster = deeper = more expressive"[35] and that Chung's various vibrato speeds play a role in "the changing emotional surface of her playing".[36] He also provided charts describing how the style of portamento in the selected excerpts of the Brahms violin concerto has changed with reference to slide lengths, as well as standard deviations for portamento lengths, representing the variety of lengths used by each player and the relative loudness of the slide compared to the main notes on either side. Whilst his findings suggest more variation between players born before 1900 in both vibrato speed, portamento length and vibrato depth than modern performers,[37] Leech-Wilkinson pointed out that vibrato and portamento in violin playing expressed how "intensely violinists feel this music", as did singers.[38] He pointed out that instrumental playing is necessarily more consistent than singing, because of expressive reasons which could derive from

[35] Chapter 5, paragraph 26
[36] Chapter 5, paragraph 32
[37] Chapter 5, paragraph 52
[38] Chapter 5, paragraph 51

interrelationships with text,[39] whilst he considered that using vibrato in violin playing could have been related to acoustic reasons of a solo instrument standing out from the orchestra, whereas portamento may work through more complex association.[40] By successfully tackling the challenging question of the extent to which the violin playing style is similar, Leech-Wilkinson's evidence-based study provides useful information on how violin playing styles have changed and how the use of empirical methods can work in the study of musicological topics. Leech-Wilkinson claimed that using vibrato could have been related to standing out from the orchestra, which is indeed true in in the genre of concerto and chamber music. This, however, brings another question on the use of vibrato in playing unaccompanied solo pieces, which I wish to explore.

The little empirical attention given to portamento (with the exception of Timmers 2007; Turner 2004) could partly be because of the unavailability of easy-to-use measurement methods, which would have derived from the fact that portamento is an expressive parameter of a non-keyboard instrument with indistinct at onset level. Nonetheless, due to little empirical data for back-up, previous findings about portamento in performance history could be suggested as "no further than general observations" (Bowen 1999: 430). Cello portamenti in the relationship between slide speed and the inter-onset-intervals on the following note and correlation between pitch leap and occurrence rate of portamento or slide speed will be considered in Chapter 4 (in the performance trends of the Brahms' F major cello sonata) and Chapter 5 (concerning Casals' artistic style of performing Bach).

[39] Ibid.
[40] Chapter 5, paragraph 48

Chapter 2

Empirical Measurement of Musical Expression

By explaining the measurement methodology of the project, this chapter discusses how a vital level of objectivity is brought to the study of musical expression in cello playing on record. The pros and cons of the measurement approach and the procedure of quantitative analysis are clarified.

2.1. An empirical approach to listening to performance

This chapter explains how a vital level of objectivity is brought to an empirical analysis of musical expression in cello playing on record. As will be shown in Chapter 3, in the discussion of how music critics perceive one performance as more expressively meaningful than others, the listening experience is a subjective and personal response to music in performance. One objective approach to listening to performance is by combining the listening experience with an empirical measurement of musical expression. Given that the current study involves an interpretative approach to interpreting musical performance, often referring to the structure of music (e.g. phrase structure), and an empirical method, i.e. an application of digital tools and statistics, I begin this chapter by discussing the pros and cons of the empirical measurement approach.

To what extent can an empirical approach to measurement be useful in the study of musical expression in performance? An empirical approach to the measurement of musical expression reinforces the listening experience of the researcher, particularly when hearing perception of expressive details is unclear. On this note, I will return to the relationship between acoustic measurements and psychoacoustics shortly. The empirical methodology for analysing musical expression is also useful because quantitative data provide scientific evidence to the academic community. In other words, by reinforcing the listening experience of the researcher and by providing scientifically proven evidence, the precise measurement of musical expression helps the music researcher to reveal how general trends, pedagogical traditions and artistic innovations can be identified accurately in the context of performance practice.

What can be considered as the drawbacks of the measurement approach and how can shortcomings be overcome? The shortcomings of the measurement approach include the limited quality of perceived phenomena and remaining machinery phase errors in the system. That is, the machine cannot perceive the significant musical gestures and nuances of performance, nor feel the sense of it, as a human does. In addition, however accurate the digital system and/or reliable the statistical test might be, there tend to be occurrences of machine phase errors in the course of acoustic analysis. Nonetheless, when listening experience and measurement approach are combined, not only can the significant musical gestures and nuances of the performance be perceived by the researcher, but the occurrences of phase errors can also be corrected by the user. Thus, the study of quantitative data using the measurement approach should always be considered side by side with the listening experience of the researcher. In the current study, the collected quantitative performance data

have been interpreted through the listening experience of the operator (i.e. myself) in relation to the analytical interpretation of the piece.

How reliable is the measurement approach in representing musical expression in performance? Given that Just Noticeable Difference (JND) is the smallest amount of change in a physical value that is perceived by humans, ignoring machine phase error at JND appears fair. Richard Parncutt (2010) points out that the JND of pitch is about 5-10 cents depending on the listener's musical training, loudness is about 0.5-1 decibel (dB), and duration is 3-5 milliseconds (ms).

Two stages are involved in the precise measurement of musical expression: firstly, expressive parameters (such as timing, dynamics, portamento etc) are measured using the computer-assisted process of visualisation of sound. However accurate the visualisation data from the computer-assisted process might be to tell us about how musical expression in performance is shaped, a further statistical analysis of measured data is helpful to obtain a conceptualised sense of general trends, pedagogical tradition and individual innovation. Thus, the obtained quantitative data are entered into a further statistical test in most cases, as discussed later.

2.2. A measurement approach to musical expression on record

By measurement approach to musical expression on record, I explain how I obtain data though recently available computer-assisted processes. I introduce a number of tools themselves, the measurement process and how the obtained data fit into the investigation.

- **Towards an analysis of recordings**

Most recordings used in the current investigation were in the formats of CD, LP and cassette tape. In the case of analogue recordings such as LP and cassette tape, the digital transformation took place in the Electronic Music Studio of Goldsmiths College. The digitally transformed sound files then were burned onto CDs.

The next step of recording analysis is to save an analysable audio file on the hard drive of a computer. Tracks from audio CDs can be copied to a computer using the 'rip' feature of the Windows Media Player, after which the ripped audio track becomes an analysable file such as wav or mp3, which is then stored on the hard drive of the computer.

Often the sound files themselves needed further sound editing; in such instances, a computer-based sound editor such as Audacity is introduced. Once processed using Audacity, the sound file is then available for further analysis through a measurement of musical expression.

Beat (or bar) level timing measurement

As will be shown in chapters 4 to 6, the discussion of performance usually begins with a comparative analysis of overall tempo and bar (or crotchet beat) level timing fluctuation. This section explains how the overall tempo and bar level rubato data were obtained.

The overall tempo of a piece is calculated based on a macro-scale timing measurement, such as the performance of an entire movement by taking the total duration and dividing by the rubato of beat at bar-level rubato or at crotchet beat level. The actual measurements can be made in two alternative ways: one way is through a reverse-conducting (tap-along) approach and the other is through an automatic beat-tracking algorithm.

Tap-along approach

A conventional approach in the musicology community is to obtain beat-level rubato through a tap-along approach.

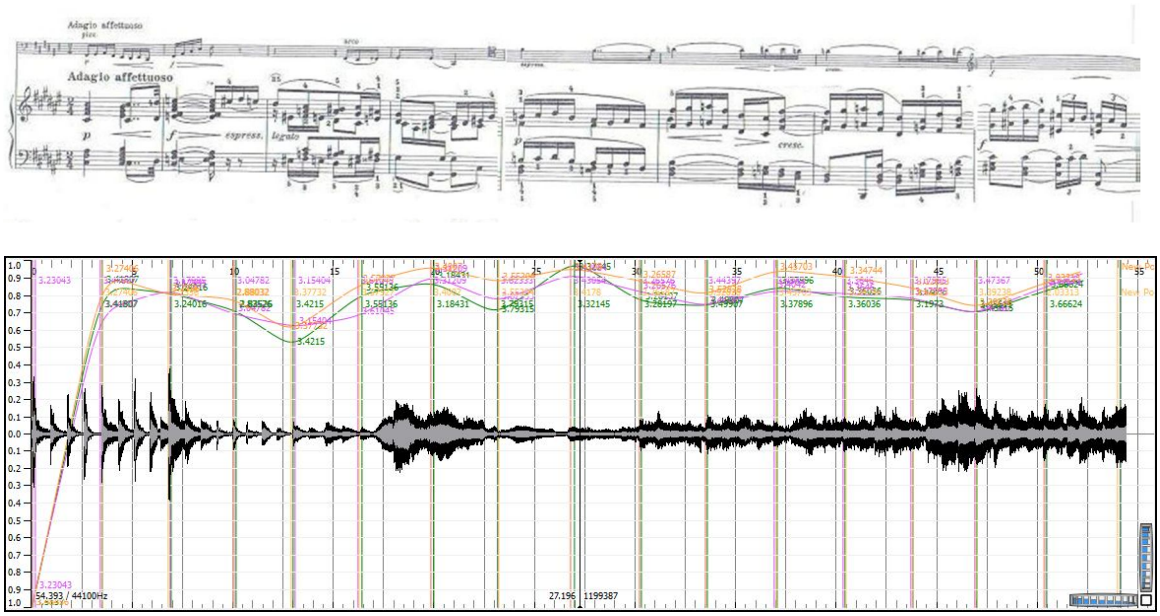

Figure 2.1. Sample beat-level timing data plot using the tap along approach, the Casals duo, bars 1-8, the Adagio affetuoso

Figure 2.1 shows the Casals duo's performance of bars 1-8 of the Adagio affetuoso from Brahms' F major cello sonata, illustrated in the interface of Sonic Visualiser: the wave-shape indicates the visualisation of the sound file, the vertical lines the tapped events and the curved line the beat-level timing diagram. Using the view menu of Sonic Visualiser, a single image of the entire sound file of the generated figure can be viewed in zoom to fit on one screen, from which a screenshot can be taken of the entire file. The upper pane of Figure 2.1 is provided here as a guideline: it contains identical information of the music in the score, which the lower pane of the sound file indicates.

Crotchet beat-level rubato data presented here were obtained through a tap-along (i.e. reverse conducting) method; i.e. the computer ';' key is tapped on one crotchet beat per bar while listening to the entered sound file, at which the time of each tap is automatically recorded by the computer. The illustrated graphic example is the Casals duo performing the first eight bars of Brahms' F major Adagio affettuoso and the first and second down beats in each bar are finger tapped. The routine that provides automatic calculation of differences between successive events is a fully functional capacity of Sonic Visualiser, together with a reverse conducting routine.

The accuracy of this tapping method is around +/- 60 milliseconds; while the precision of my computer's internal clock is about 60 milliseconds, the response time of the

human operator's finger tapping is about 30 milliseconds and the average human timing perception is about 30 milliseconds. Therefore, it is better to ignore variations of less than 60 milliseconds. Additionally, accuracy also depends on the operator tapping at the beginning of each event accurately.

Automatic beat-tracking system

Automatic beat-tracking can be seen as an alternative approach to the reverse-conducting method, and has been developed in response to the precision limits of sensorimotor synchronization and the time consuming nature of user input in the manual annotation system.

Figure 2.2 illustrates examples of readings of the beat tracking algorithm in the upper pane and the corrected phase errors with user inputs in the lower pane. Annotated inter-beat-intervals (IBIs) are shown as vertical black lines and copied IBI data into a time value layer create a representative time curve, shown in red.

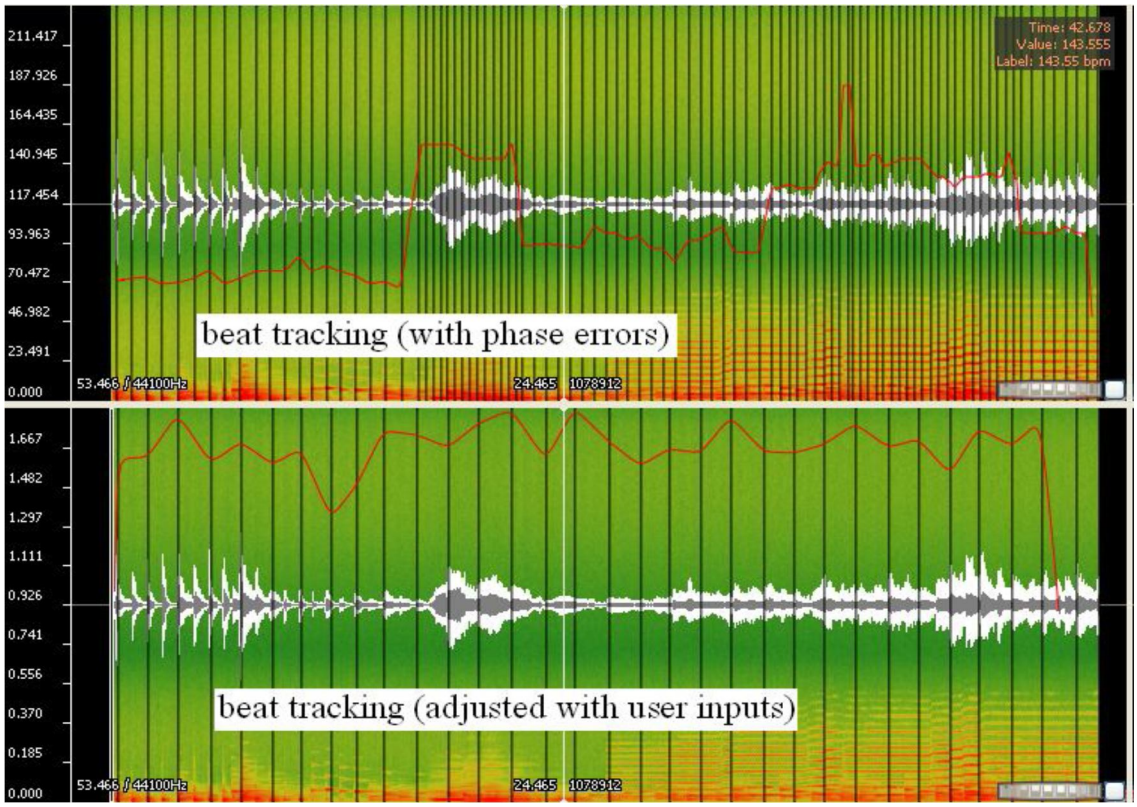

Figure 2.2. Sample beat tracking plot, with phase errors in the upper pane and corrected version in the lower pane: Casals duo, bars 1-8, the Adagio affetuoso, op.99

The beat-tracking algorithm of the audio creates a graphical representation, as part of an interactive interface in association with the spectrogram. A spectrographic analysis generates a three-dimensional plot of time, frequency and amplitude. The accuracy of frequency readings in a spectrogram is determined by the ratio of sample-rate and frame-size, giving constant *k*. Here, the frame-size was set at 512 samples, which, with a sample-rate of 44,100Hz, gives a value of *k* of 43.01Hz.

$$k = \text{sample-rate/frame-size} = 44100/512 = 86.132$$

Frequency is accordingly plotted in steps of 86Hz. The size of the steps along the time-axis is determined by the frame-size divided by sample-rate, i.e. $1/k = 0.011$s or 11ms. According to Johnson (1999: 78),

> In order to represent the time-domain to a level of precision commensurate with the ear's ability to discriminate rapid changes, we need a high value of *k*. This 'different limen', dL, is generally taken as c.20-30ms (0.02-0.03 seconds) for the average competent listener, though it may be less for the experienced performer. Thus, for a string of notes played at MM. 200, where each note lasts about 0.3s, psycho-acoustical research suggests that the ear could in theory detect ten events within each note. It is of course not quite that simple, for Gestalt processes tend to smooth small irregularities; however, the perception of fine nuances of timing can be cultivated by ear-training such as is demanded of high-level performance on non-keyboard instruments.

Thus, a spectrogram gives good definition on the time axis, and is consequently particularly useful for analysing time related expressive parameters such as rubato and portamento speed.
A beat tracking algorithm works fairly efficiently within its preset (default range) beat option. The preset of the beat tracking system, however, automatically detects the very first note onset value. The unavailability of a function allowing the user to choose the beat of their choice within the system means that some phase errors are likely to occur in automatically tracked beats. With the availability of a graphical spectrographic interface, machine errors can be corrected by the operator's input, by adjusting beat-tracking depending on their choice of inter-beat-intervals (IBIs).

The computer system automatically logs readings of the user's adjusted inputs; i.e. inter-beat-interval durations in milliseconds. Given the consideration that only occasional phase errors occur within the given preset of beat tracking, if a user were allowed to change the preset identification of the beat tracking rate, it would be more convenient to adopt to for adoption in musicology research. The automatic beat tracking routine is functional under the Sonic Visualiser platform.

Audio alignment

Another way of comparing timing in multiple renditions of the same piece is by using the audio alignment tool (see Figure 2.3) under the Sonic Visualiser platform. The alignment preserves the temporal order of moments, in which the alignment path associates one sound file with another. More than two recordings can be aligned against a single reference sound file, which can be heard and shown in the Sonic Visualiser platform interface. When the chosen sound files are of the identical music excerpt, by selecting the appropriate button on the toolbar they can be automatically audio aligned based on pitch, with one file acting as the reference file and the remaining one aligned with it.

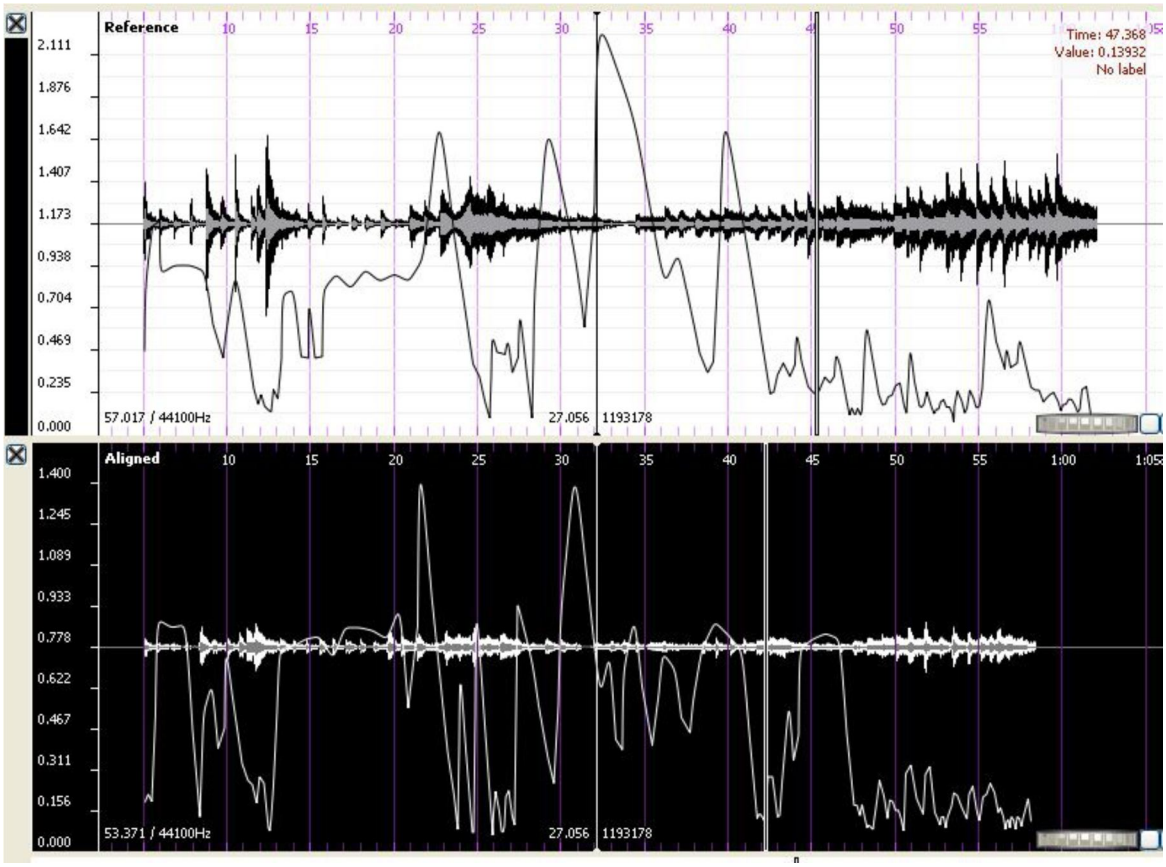

Figure 2.3. Sample audio alignment: the Casals duo (upper pane: referenced audio) and the Piatigorsky duo (lower pane: aligned audio), bars 1-19, the Adagio affetuoso, op.99

The upper pane shows the performance of the Casals duo, which in this case is used as the reference file; the lower pane, the Piatigorsky duo, which is aligned to the Casals duo. The illustrated graphic examples are the duo performing the first eight bars of the Adagio affettuoso from Brahms' F major sonata. The black wave-shape indicates the sound file

visualisation of the Casals duo, the black line the time values of the IOI diagram and the white the Piatigorsky duo. The black vertical line in the middle of the upper pane illustrated in overlapping to the wave-shape sound visualisation and the white in the lower illustrates the pitch-based alignment within the time span.

Although audio alignment might not provide any statistical data for further analysis, the relationship between tempo and phrase structure in multiple renditions can be perceived more efficiently using the alignment tool.

- **Analysis of rhythmic patterns**

Rhythmic patterns are analysed with more detailed attention at note onset value, usually focusing on local level excerpts eg, 3-4 bar duration.

Note onset detection

Similar to the beat-tracking algorithm, note onsets can also be automatically detected using the onset detector algorithm in association with the spectrogram layer under the Sonic Visualiser platform. Annotated inter-onset-intervals (IOIs) are shown as vertical black lines and copied IOI data as a red curve in Figure 2.4. Inter-onset-interval durations (in milliseconds) were also automatically obtained by calculating the differences between successive event onset times.

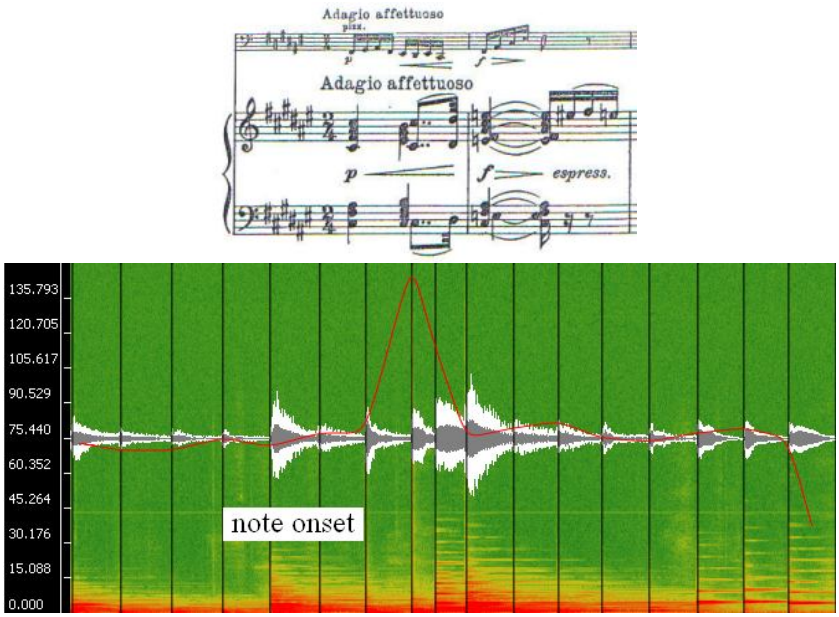

Figure 2.4. Sample note onset detection plot: Ma-Ax duo, bars 1-2, the Adagio affetuoso, op.99

The note onset detector also provides some phase errors, which can be easily corrected by using an eraser function on the graphical interface of the spectrogram. Given that JND is the smallest amount of change in physical value that is perceived by humans, ignoring the machine errors at the point of JND, in this case 5 milliseconds, appears reasonable. Using the note onset detection tool, the shaping of musical expression can be analysed at a more detailed level than that of beat-level.

Time-series analysis

Whether data is obtained through the reverse conducting method or the beat-tracking system at the interval of inter-beat-interval (IBI) or inter-onset-interval (IOI), the captured data are then entered into an Excel spreadsheet, to create a time-series graphic representation (see Figure 2.5).

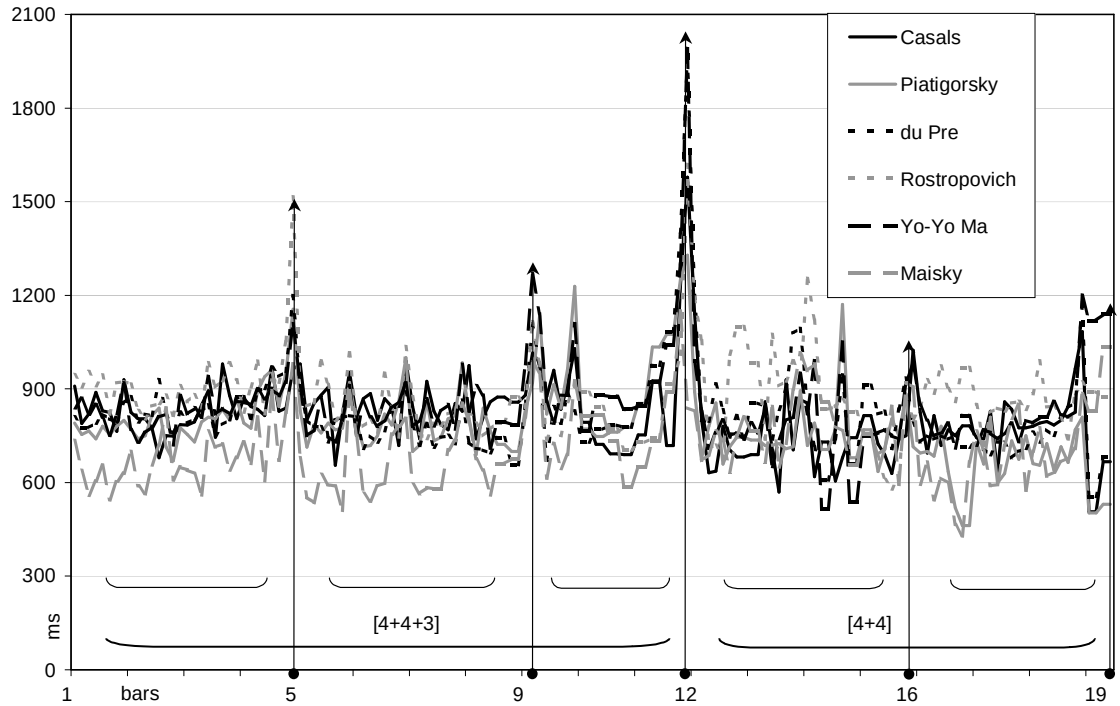

Figure 2.5. IOI data converted into time-series analysis: bars 1-19 of the second movement of Brahms' F major sonata from the five selected performances

Figure 2.5 illustrates the IOI timing fluctuation data of the selected five performances of Brahms' F major cello sonata, second movement, bars 1-19. The diagram is plotted in seconds and therefore it indicates that the higher the graph, the slower the tempo. As shown

in Figure 2.5, executions deriving from the same excerpt can be plotted overlapping each other; the time-series graph is useful for identifying general tendencies of expressive timing in performing the same excerpt of music in multiple renditions.

Metronomic value conversion

The average value of captured IBI data in seconds (or milliseconds) can then be entered into the bpm calculator,[41] together with appropriate beat value, which provides a global metronomic value of the selected performance. By global metronomic value, although some of the selected performance might be that rubato changes the local average, I merely focus on metronomic value as a numerical one rather than as a musical process. In any cases, beat-level data converted into metronomic values act as a useful interface for musicians and musicologists.

- **Macro-scale dynamics measurement**

Dynamics mark the relative changes in intensity, and do not express precise decibel levels. Loudness is a psycho-physical sensation perceived by the human auditory perception and in psycho-acoustics, a level 10 dB greater usually means twice as loud. Decibel is one-tenth of a bel, which is the logarithm of the ratio of any two energy-like quantities. Although it is true that dynamics ≠ loudness ≠ dB, decibels (dB) provide numerical value to compare one performance to another. By measuring musical dynamics, I intend to measure the exact intensity level of forte or pianissimo in decibels (dB). For the macro-scale dynamics measurement, there are two different approaches available: one is to measure the loudness level that is relevant to the beat-level timing data; the other is to identify the notably strong peaks in the chosen musical excerpt.

Measurement of loudness level at the beginning of inter-beat-intervals

Loudness level can be measured at the note onset beginning of inter-beat-intervals (IBIs), and this was used for the investigation. Physically measured loudness level data provide exact levels of detailed expressive parameters in performance, which can then be calculated into the correlation rate of data obtained. The selected recordings were entered as digitised format

[41] Freeware, developed by Peter Joseph Flannery of Junglest Ltd

sound files; the Mazurka output plug-in under the Sonic Visualiser platform then scales the loudness level of the given excerpts. The data obtained are then subjected to a further statistical modelling method and correlation analysis, Pearson's correlation.

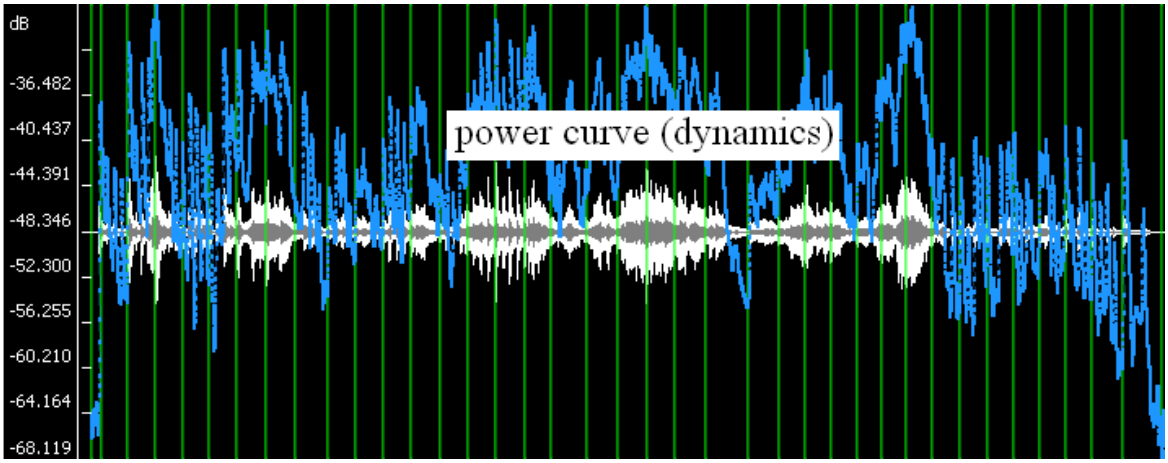

Figure 2.6. Sample power curve: Ma-Ax duo, bars 1-19, the Adagio affetuoso, op.99

In spite of the availability of processing tools that extract and calculate loudness levels easily, the fact that dynamics are continuous modulation signals makes it complicated to approach how one measures loudness levels in performance. By using the smoothed power output from the Mazurka Power Curve plug-in written for the Sonic Visualiser software this aspect of performance can be measured. The output plug-in automatically extracts a graphic representation, which is illustrated as a blue curve across the entire range in Figure 2.6; annotated IBIs are shown as vertical green lines and the loudness level of IBI time was measured manually at 50 to 70 milliseconds after the IBI time. I read loudness level after the onset time due to the fact that smoothing causes the peak amplitude to be delayed.[42] The JND in loudness varies from 3 dB at the threshold of hearing to 0.5-1 dB for loud sounds and therefore it is safe to ignore variances of data at the point of less than 1 dB.

Strong peak identification

Detecting strong peaks from the visual script of signal processing tools is straightforward. The software visualisation interface clearly shows relatively strong peaks of loudness/intensity levels as yellow lines in the lower plot. The intensity level can be easily detected in the Praat script and system. Strong peaks shown in the display are circled in red in

[42] I thank Craig Sapp for this comment.

the Praat script.

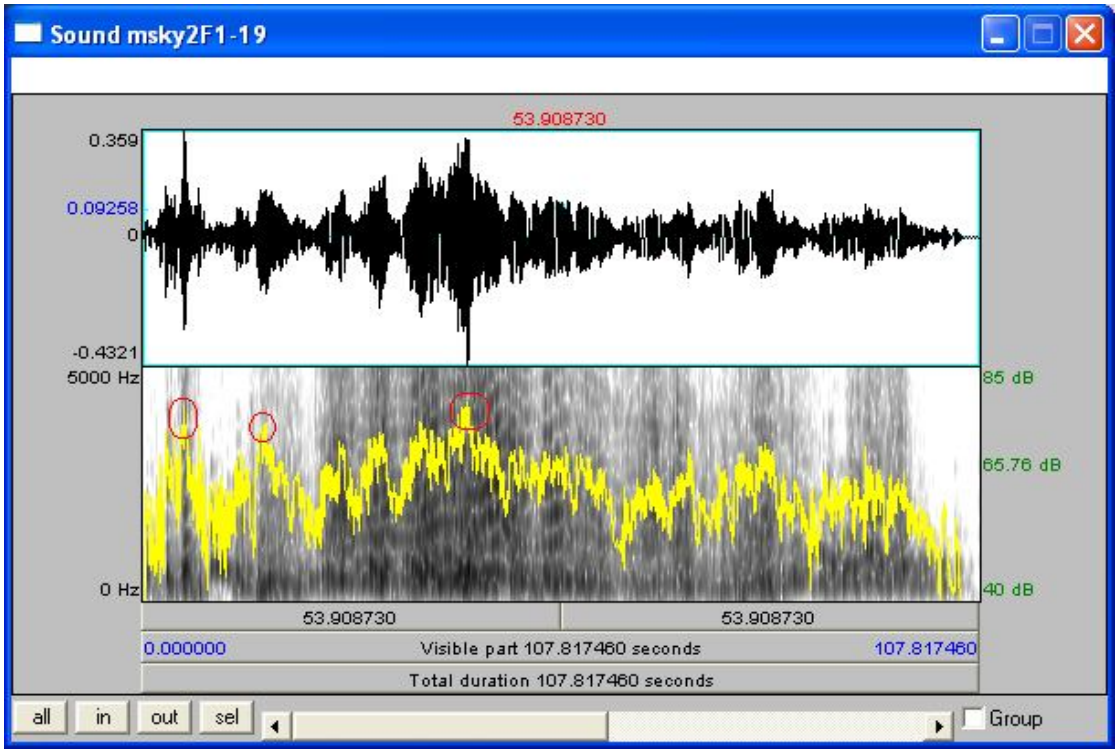

Figure 2.7. Sample strong peak identifier (Praat script), Maisky duo, bars 1-19, the Adagio affetuoso, op.99

Dynamics levels are set within the range of a relative dynamic level of 40-85 decibels (dB) at all times, because computational analysis concerns multiple recordings of the same repertoire. By measuring dynamic level within an identical range, it is possible to avoid differences caused by absolute dynamic level changes in the transfer of the original 78 rpm record or LP to digital formats such as compact disc. This, however, cannot be seen as measuring relative dynamic level. Relative dynamics can, however, be computed through the modeling method of musical expression, which will be discussed later. In this case, the strongest dynamic level of the phrase is normalised at 10 and my reading of actual dynamic levels of the seemingly strongest dynamic is plotted according to relative levels.

The locations of relatively strong dynamics vary from one performance to another, even in the same piece. Thus, this approach is not suitable to be subjected to statistical analysis. Thus, rather than attempting to draw another diagram, the findings have been tabulated.

- **Portamento data**

Portamento data capturing consists of two different techniques: that is, speed of portamento can be measured using spectrographic analysis accurately and pitch leap can be computed using spectral analysis.

Inter-onset-interval of portamento and spectrographic analysis

Slanting lines (as marked with white vertical lines) in the spectrogram represent portamento and the black vertical line note onset, which is how the onset-offset intervals of portamento can be measured (see Figure 2.8).

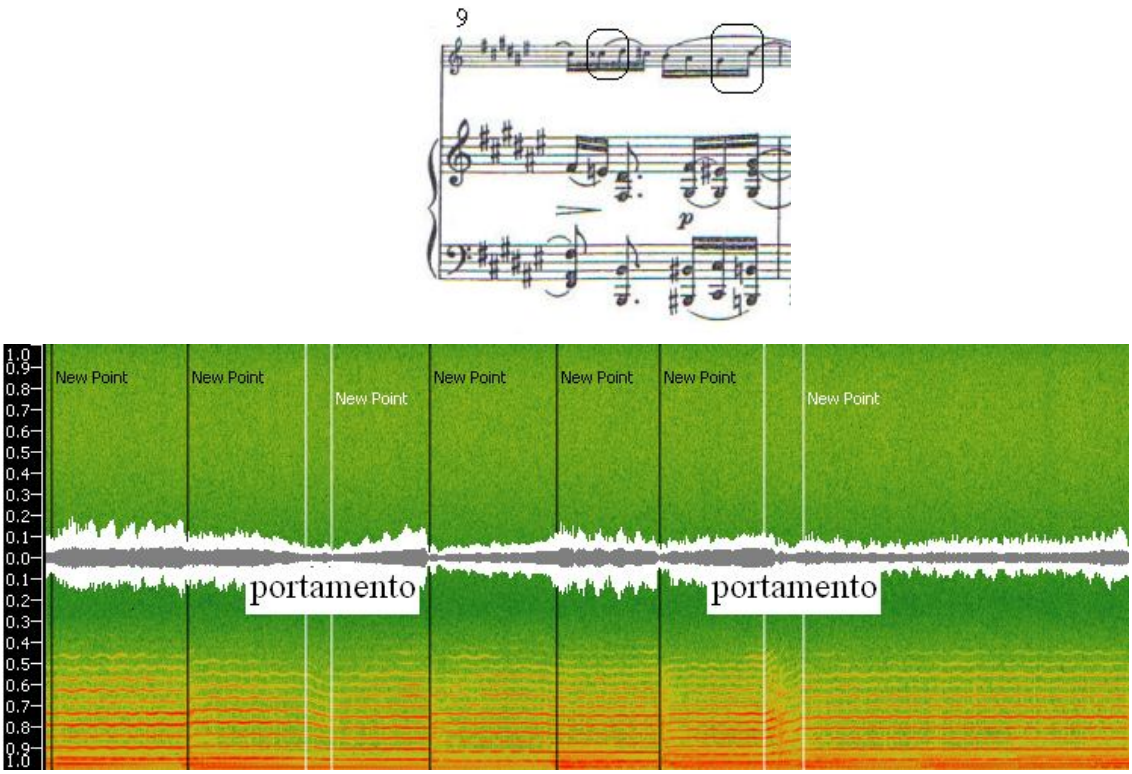

Figure 2.8. Portamento in spectrographic analysis, Casals, bar 9, the Adagio affetuoso, op.99

As mentioned earlier when discussing the beat-tracking algorithm, due to providing a good definition of precision rate on the time axis, spectrographic analysis is useful for analysing time-related expressive parameters such as speed of portamento (or IOI of portamento). The portamento measuring point is the beginning of the curve. A limitation in spectrographic analysis is that this method provides less effective definition on the frequency axis. Frequency variation, however, can be measured accurately using a spectrum, which will be discussed later.

Pitch leap tracking and spectral analysis

Pitch leap can be measured using spectral analysis under the Sonic Visualiser platform (see Figure 2.9).

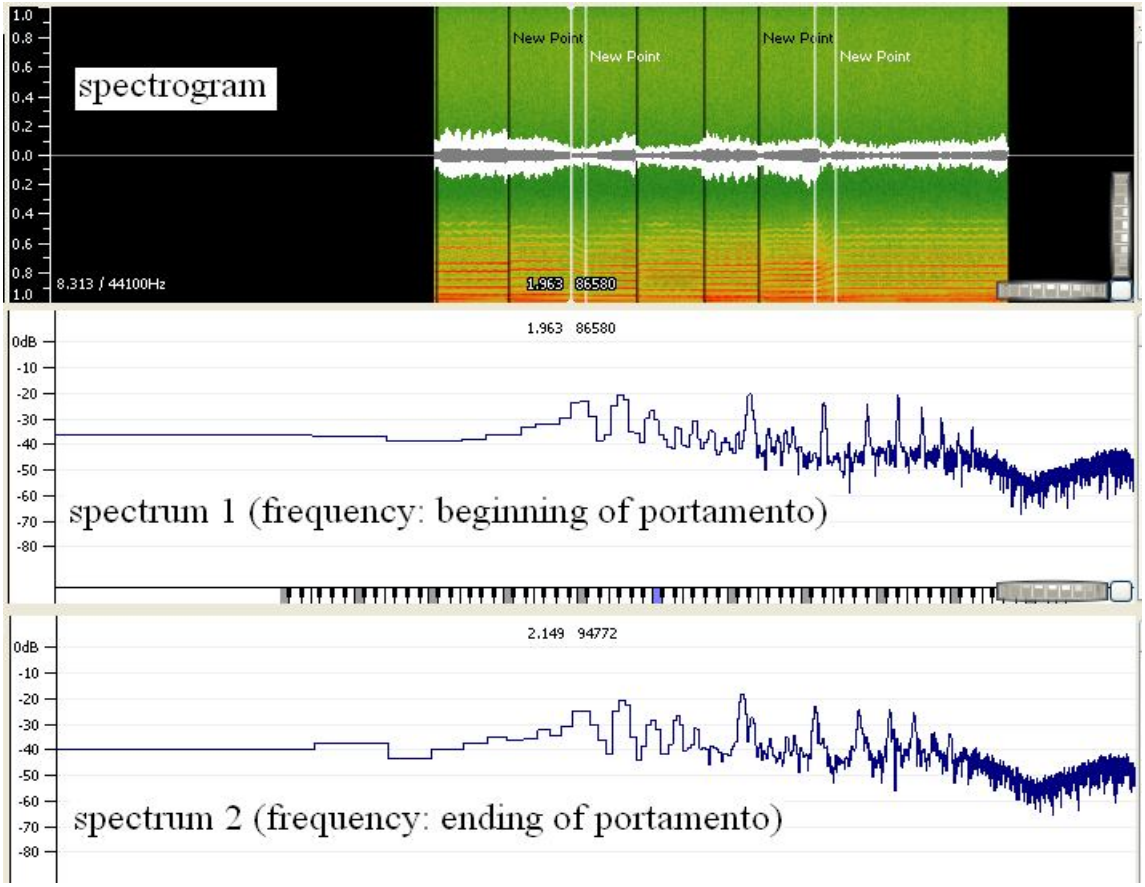

Figure 2.9. Sample spectrum: frequency measurement tool, Casals, glide between second and third pitches, bar 9, the Adagio affetuoso, op.99

Spectral analysis is used to measure the frequency variation of portamento. It is two-dimensional, the time-element being ignored (or technically, assumed to be a unity). The spectrum accordingly analyses all events during the frame-size and measures the accumulated energy in each frequency band. By setting the frame-size relatively large, we obtain values of *k* sufficiently small to allow very accurate readings of frequency. In Figure 2.10., the frame-size was set at 131072, which with a sample-rate of 44,100Hz, gives a value of *k* of 0.3364.

$$k = 44100/131072 = 0.3364.$$

The advantage of this method is that we obtain a very accurate measurement of the frequency spread. The frequency of beginning and ending of portamento was measured using two different spectrums, which basically calculate stat end tone as illustrated in Figure 2.10; the

obtained value in Hz was then converted into cents, which was then subjected to another conversion into intervals.

- **Vibrato data**

As with portamento data, vibrato data capturing consists of two different techniques: that is, speed of vibrato (in cycles per seconds) can be measured using spectrographic analysis accurately and vibrato extents can be computed using spectral analysis.

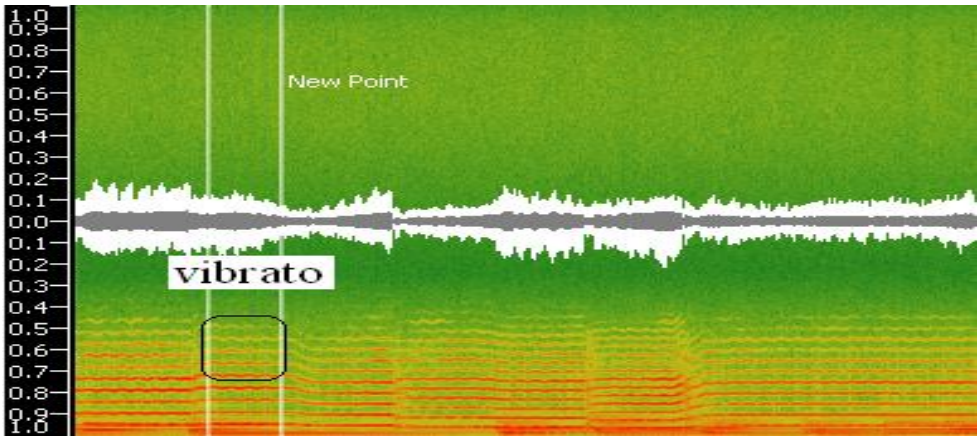

Figure 2.10. Vibrato in spectrographic analysis, Casals, bar 9, the Adagio affetuoso, op.99

Wave-like cycles in the spectrogram (see Figure 2.11) indicate vibration. (N.B. the spectrogram of keyboard instrument performance is illustrated by straight lines without wave-like cycles). Vibrato speed can be computed with the equation below.

vibrato speed (in cps) = time / number of peaks (waves) in spectrogram

In this case, Casals' vibrato speed of the second note (circled) is 5.94 cycles per second (cps), as it was time (1.880 minus 1.207 equals 0.673) divided by number of peaks (4). The identical method for measuring pitch leap of portamento using spectral analysis can be applied to computing extents of vibrato.

- **Measurement of musical expression**

I have explained the ways in which data were obtained using the recently available computer-assisted processes. The obtained data often require further statistical analysis, which the following section introduces.

2.3. Statistical analysis of musical expression data

Raw data of acoustic properties obtained from signal processing tools are subjected to further statistical analyses. Using statistical techniques, one can analyse a set of data, which can be generalised into a scientifically informed conclusion beyond that set. Statistics will be used in order to obtain a conceptualised sense of musical expression data, which will tell us how general trends, pedagogical tradition and individual innovation in performance are shaped.

The following will be executed in the process of quantitative data handling, hypothesis testing, central tendencies (average, standard deviation), normalisation of data set, and correlation analysis (Pearson's product-moment correlation). Specialist terminology and the processes involved will be discussed here.

- **Descriptive Statistics: Central Tendencies**

Rather than showing raw data, it is useful to present a representative single number: the most commonly used types are average and standard deviation of data from a single performance. Average is used in association with calculation of the metronomic value of tempo. That is, mean was computed from timing data at the absolute level of each rendition, which was then converted into a metronomic value of beat per minute (BPM). The standard deviation (SD) quantifies scatter and computes how much the values vary between each other; this was adopted to obtain the characteristic style of each artist regarding portamento speed in the current study.

Central tendencies also provide useful bases for further comparative statistics in computing the modulation depth of musical expression, such as timing or dynamics. Here, Repp's (1998) terms of absolute (SD) and relative (SD / mean) modulation depths were used to analyse similarities in variation extent. Absolute modulation can be computed through between the standard deviation and the average of the musical expression data of the selected performances. For the relative modulation, the correlation between the standard deviation divided by the mean and the average of expressive parameter data of the selected performances was computed.

- **Comparative Statistics: correlation**

I use Pearson's product-moment correlation coefficient *r*, because I intend to discover measures of correlation (i.e. correlation between two variables) between two events. I shall briefly explain the two statistical techniques that have been used in this study, namely

Pearson's product-moment correlation.

$$r = \frac{\sum_i (x_i - \bar{x})(y_i - \bar{y})}{\sqrt{\sum_i (x_i - \bar{x})^2 \sum_i (y_i - \bar{y})^2}}$$

Equation 2.1. Pearson's product-moment correlation

Pearson's product-moment correlation coefficient *r* is a measure of the linear relationship between two columns of data. The value of *r* can range from -1 to +1 and is independent of the units of measurement. This is a useful method for investigating the similarity in how expressive parameters were modified between the two selected performers. Returning to Pearson's product-moment correlation equation, the *x_i* indicates the *i*th element in a sequence called *x* and the $\bar{x}$ indicates the average shown for the sequence. In this case, *x* is used to indicate an expressive value of performer *A* and *y* is used to indicate a sequence of performer *B*.

The contour of the tempo played by the two performers can be similar or dissimilar. That is, a value of +1.0 indicates exactly the same, i.e. a perfect *positive* correlation, -1 means opposite handling of expressive parameters between one another, i.e. a perfect *negative* correlation, and 0.0 indicates no co-variation in musical expression is found between the two performances, i.e. a completely random (no linear) relationship between the two variables.

- **Hypothesis testing**

The most significant aspect in the application of statistics in empirical musicology research is having a hypothesis (i.e. research question) as the "prior conceptual step" (Windsor 2004: 197). In other words, even though empirical observation and/or measurement might be gathered through a post facto (after the event) analysis, which in fact can be seen as a bottom-up approach, the quantitative analysis itself should in reality be conducted through a top-down process. That is, a researcher should have research questions ready prior to any measurement processes. In the present study, the hypothesis will be based on aspects of cello performance practice on record. For instance, a hypothesis could be made that the same pedagogical group share similar patterns of handling musical expression or the portamento occurrence rate is related to the artists' age at the time of recordings. Depending on the

empirical result of correlation and accompanied *p*-value, readers will be guided into how far the two aspects, the handling of musical expression by the two artists from the same pedagogical group, or portamento occurrence rate and the artists' age, could be correlated, which leads to an evidence-based conclusion about portamenti in cello performance on record.

The "statistical significance" and p-value

Hypothesis testing leads to a conclusion as to whether or not the deriving result is "statistically significant", based on the results of the *p*-value. The "statistical significance" in a literal sense indicates a small *p*-value, which merely verifies that the possibility of the result due to chance alone is being small.

The *p*-value is a probability, and it measures how likely it is that the experimental results of the correlation value would have arisen under the null hypothesis; i.e. whether my hypothesis may not be true. When the null hypothesis is true, the absolute value of the *t*-statistic would equal or exceed the observed value. That is, a small *p*-value is evidence that the null hypothesis is false and the attributes are, in fact, correlated. For instance, a *p*-value of 0.0001 means that only one in 10,000 times could the results of the experiment be wrong. In other words, a *p*-value of 0.0001 indicates that my result of correlation is statistically significant. But the *p*-value is likely to be small when the population is large.

However, in an analysis of timing fluctuation correlation of two different performances, the *p*-value was computed on the assumption that all of the x_i and y_i values were independent of each other. However, successive times from previous events are unlikely to be independent, because tempo in a musical performance varies smoothly and continuously. Thus, although the given *p*-value might be a lower bound on *p*, the actual *p*-value is likely to be higher than that.

Returning to finding the "statistical significance", it becomes problematic when the *p*-value obtained is larger that $p = 0.5$, which indicates the results of the experiment could be wrong. A relatively large *p*-value indicates that the data do not provide any reason to conclude that the correlation is real. At the same time, a large *p*-value indicates that one can claim that whilst the null hypothesis might not be true, there is no sufficient evidence to reject the null hypothesis.

Having discussed the concept of hypothesis testing, I shall move on to explaining the processes involved in statistical analysis in the present study and what can be achieved using

statistics in humanistic enquiry of musicology research.

- **Modelling musical expression**

It is widely assumed that pedagogical relationships would have had some influence[43] on performance style and interpretation. As mentioned in the previous chapter, although there have been a number of experimental investigations concerning musical expression (e.g. Timmers 2005; Windsor et al 2006) and performance trends (Repp 1998; Sapp 2007), none of the studies considers pedagogical influence in the handling of musical expression in performance trends.

A correlation analysis of data sets from two different performances can discover a similarity or dissimilarity between the two. The equation is modelled based on a statistical assumption that once a personal style of individual performance is computed, the correlation reading could identify whether similarities could have been derived from influences of one criterion or another. At this point, I explain how variants could be further calculated through the statistical modelling equation of musical expression, which will then be entered into a correlation analysis.

Inter-beat-interval

Inter-beat-interval (IBI) data is the absolute level data obtained from a computer-assisted process. Based on the hypothesis that a beat level event of an individual performance is a combination of accepted ways of interpretation and individual contribution, the main equation of musical expression is modelled. The hypothesis is that inter-beat-interval (IBI), i.e. beat level events of individual performance captured by the signal processing tool, consists of the average time per beat, together with the average musical expression and the individual musical expression (personal style): the equation is shown in Equation 2.3.

The strategy of my modelling method lies with an analysis of expression by measurements in the comparative perspective concerning the boundary between average expression and individual (personal) expression. The equation is modelled based on a statistical assumption that once a personal style of individual performance is computed, the correlation could identify similarities between any two performances at precise levels. The two essential points in the interpretation of the empirical findings are (1) how far di/similar

[43] The most common pedagogical influence in string playing is identified through bowing and fingering. Any string players would have experienced awkwardness at having been asked to change perfectly workable bowing and fingering at the time of working with a new teacher and/or a new conductor.

the extent of similarity in the correlation and (2) on what criteria the two performances were selected.

Equations 2.2. Inter-beat-interval (IBI_{ni}) and individual expression style (K_{ni})

inter-beat-interval (IBI) of beat *n* performance *i* is given by

$$IBI_{ni} = \overline{IBI}_n + \overline{\Delta t}_n + \Delta t_{ni}$$

$$IBI_{ni} = \overline{\Delta t} + T_n + K_{ni}$$

The IBI of beat *n* performance *i* = average time per beat + average expression + individual (personal) expression

$$K_{ni} = IBI_{ni} - \overline{\Delta t} - T_n$$

individual (personal) expression (K_{ni}) = IBI of beat *n* performance *i* - average time per beat – average expression

If average time per beat is the average deviation from the grand overall average, then the IBI of a note is the average deviation in tempo plus the average expressive timing value for that note (T_n) plus its specific value (K_{ni}). A correlation of quantitative data is also computed in two ways: the absolute level of inter-beat-interval (IBI_{ni}) data sets, as well as the relative level variants further calculated through the statistical modelling equation of musical expression (K_{ni}). The correlation rates of musical expression by artists in the same pedagogical groups will be investigated in addition to those by artists with no pedagogical links. By comparing findings from the correlation analysis at both absolute and relative levels, the hypothesis on pedagogical influence will be tested and the results will be presented in Chapter 4 when discussing Brahms performance trends.

The current chapter has shown the ways in which musical expression could be measured using musical processing tools and how variants could be further computed through a combination of a conventional statist approach and the original equations modelled for this study. The following four chapters will present the original findings of musical expression in

cello playing on record.

Chapter 3

The Changing Focus of Record Reviews in Cello Performance Practice

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Focusing on the receptions of recordings with particular reference to works by Brahms, J.S.Bach and Prokofiev, this chapter considers how the study of record reviews could play an integrated role in the empirical investigations of cello performance practice on record. The study in this chapter reveals the ways in which the focus of record reviews in relation to the chosen repertoires changes over the course of the twentieth-century, and how this is evidenced.

3.1. Record reviews of cello performance practice on record

This chapter considers how the study of record reviews could play an integrated role in the empirical investigations of cello performance practice on record. Music critics evaluate recordings to the best of their perception and knowledge of the time and therefore music criticism provides informed guidance to the public (e.g. the consumers of recordings and concertgoers) as well as indicating the opinions of the public. In spite of the problems of anonymity,[44] the study of the reception history of recorded music reveals the changing value judgement of music critics, and their expectation of the repertoire, performing trends and particular performers.

By evaluating the record reviews published in major music magazines such as *Gramophone*,[45] *Musical Times* and *The Strad* from 1923 to the present day, I investigate the ways the focus of record reviews changes over the course of the twentieth-century in relation to the chosen repertoires, the two Brahms cello sonatas, Bach's cello suites and Prokofiev's cello sonatas, and also consider how this is evidenced. Research questions are (1) the change of focus in reviewing tendency from work to performance, (2) changing tastes in performance styles (e.g. Do reviewers lead or follow?) (3) the increasing sense of "historicisation" which comes through a longer time span (different formats) including HIP and early recordings. For instance, a sudden interest in early-recorded materials in the 1990s (whereas not much in the 1920s) could be suggested to be deriving from the 70 years of recording history.

The earliest appearance of a record review of Brahms' cello sonatas was in 1928, a decade earlier than when a review of the Bach cello suites on record was published, namely of Harrison/Moore's 1927 recording of the E minor sonata, which also received a second review in 1929. A few landmark recordings of repertoires emerged throughout the twentieth century, not only because several artists recorded the Brahms cello sonatas, often more than once [46] during their careers, but also because the tastes of music critics regarding the repertoires changed. Casals' name appeared in *Gramophone* from the founding year (1923); in the December issue, all Casals' records were strongly recommended for listening. *Gramophone* also published an article on "Casals the gramophone celebrities" in 1930 and also the artist's own article entitled "The Story of My Youth" in 1932, where the cellist talks

[44] By anonymity, I mean the difficulty of deducing the identity of the writer based on mere initials or penname and possible editorial interference with the actual writing.

[45] *Gramophone* is often the subject of criticism, because of favouritism towards British composers and performers, as well as its close commercial relationship with big recording companies such as DG, Decca, EMI and Phillips.

[46] For instance, Rose, Fournier, Tortelier, Starker, Bengtasson, Rostropovich, Harrell and Isserlis recorded Brahms' cello sonatas more than once in their careers.

about his "religious" takes on J.S.Bach's cello suites. Given that the actual review of the Bach suites first appeared in 1938 in the news section of the Bach Society, it can be suggested that Casals received more attention for his performance of the Bach cello suites during the pre-WW2 period. The Western rendition of Prokofiev's cello sonata in C major op.119 by Navarra / Holecek (1958) was reviewed in 1960, more than a decade earlier than the 1955 rendition by premier artists Rostropovich / Richter, which was eventually reviewed in 1973. Rostropovich's authority on twentieth-century cello music, including that of Prokofiev, has received some attention since 1986.

This chapter aims to discover how record reviews could be understood as evidence of a changing focus in music history, and why that focus changes. Evidence of changing focuses of the selected repertoires will be considered at relevant point of history. I shall also discuss why certain renditions were seemingly considered as landmark interpretations[47] of the repertoire and how the views of the landmark interpretations remained the same in record reviews until a certain point in history, and why. The changing focus of record reviews can also be suggested to occur in response to extra-musical factors in outlook. One extra-musical aspect could be related to the development of technology, such as in numerous pre-WW2 recordings of short encore pieces and records with a short playing time, whereas another could be financial impact, such as the cost of discs in relation to the income of consumers. These aspects will also be considered.

At this point, the recordings under consideration will be introduced. Tables 3.1.1. and 3.1.2. show the recordings of the two Brahms sonatas. These selections by no means represent a complete set of Brahms cello sonatas on record. The significance of the Brahms cello sonatas as concert repertoires is demonstrated by the fact that many artists recorded the sonatas more than once during their careers. In excess of forty have been issued commercially,[48] but as some earlier recordings (particularly by artists who made multiple renditions in the 1950s to 1970s) are out of print, these recordings are impossible to obtain. All the performances studied are studio recordings made for commercial sale as records, with the exception of the 1957 recording by Rostropovich/Richter, which was taken from a broadcast concert available on Youtube. Every effort has been made to secure all the

[47] By landmark interpretations, I mean how music critics evaluate the Elgar cello concerto on record with reference to either Harrison's or du Pré's interpretations. That is, early-recorded Elgar (whether it is at the time of the new release in the 1930s or digital re-issues in the 1980s) has almost always been compared with Harrison's recording with the composer as conductor, which then moved on to either of du Pré's recordings (with Barbirolli in 1965 or with Barenboim in 1970) in the case of modern Elgar renditions.

[48] Note that the discography catalogues by the National Sound Archive of the British Library and by the Centre for History and Analysis of Recorded Music tend to provide duplicate copies of the same recordings.

available high-profile recordings. It can be suggested that the twenty five selected recordings are sufficient material to represent the Brahms performance practice of the repertoire. The recordings were chosen with regard to their current availability, and also to their significance in the history of cello performance.

Most pre-WW2 recorded performances are included (e.g. Harrison, Feuermann, Casals, Piatigorsky, Pleeth and Rose). It was not easy to obtain 1950s recordings, because most tend to be out of print: a few items from the 1950s were added, including the much talked about Fournier/Backhaus and Starker/Sebők versions. Amongst the numerous post-WW2 recordings, priority of selection was given to the cultural history of listening; the selection includes the three Grammy[49] awarded recordings (Rostropovich/Serkin in 1984 and Ma/Ax in 1986 and 1992) and a few widely talked about performances (e.g. du Pré/ Barenboim, Tortelier/de la Pau and Harrell/Askenazy). The Grammy awards could be interpreted as social recognition of the performances themselves as well as the repertoires in the years they were awarded. Some artists made multiple recordings of the Brahms, and a few of these are considered, including Starker with Bogin (1954), with Sebők (1959) and with Buchbinder (1994); Rose with Owen (1947) and with Pommier (1983); Harrell with Ashkenazy (1980) and with Kocacevich (1997); Rostropovich with Richter (1957) and with Serkin (1983); Ma with Ax in 1985 and 1992 and Isserlis with Evan (1984) and with Hough (2005).

[49] Prior to 1984, Grammy Awards for Best Chamber Music Performance were given to string quartets, piano trios, string trios and string duets. Rostropovich and Serkin's rendition of the Brahms' cello sonatas in 1984 mark the first performance to obtain a Grammy award for a cello-piano duo.

Table 3.1. Selected recordings of Brahms' cello sonatas used in this investigation

Table 3.1.1. Brahms' cello sonata in E minor op.38

Artists (cello / piano)	Dates	Label
Harrison / Moore	1927	SYMPOSIUM 1140
Feuermann / van der Pas	1934	Pearl GEMM CD 9443
Piatigorsky / Rubinstein	1936	Pearl GEMM CD 9447
Gendron / Francaix	1952	IMV031
Starker / Bogin	1954	Nixa PLP 593
Fournier / Backhaus	1955	Decca 425 973-2
Rostropovich / Richter	1957	youtube
Starker / Sebők	1959	Apex 2564 69900-0
du Pré / Barenboim	1968	EMI 7 63298 2
Tortelier / de la Pau	1978	EMI 50999 6 88627 2 5
Harrell / Ashkenazy	1980	Decca 414 558-2
Shafran / Gottlieb	1980	MELODIYA : C10 14787-88
Rose / Pommier	1983	Virgin Classics 7243 5 61417 2 8
Rostropovich / Serkin	1983	DG 410 510-2 GH
Isserlis / Evans	1984	Hyperion CDA66159
Yo-Yo Ma / Ax	1985	RCA RCD1-7022
Yo-Yo Ma / Ax	1992	Sony 48191
Starker / Buchbinder	1994	RCA 09026 61562 2
Bylsma / Orkis	1995	SONY SK 68 249
A Bekova / E Bekova	1996	Chan 9479
Harrell / Kocacevich	1997	EMI 5 56440 2
Schiff / Oppitz	1997	PHILIPS 456 402-2
Maisky / Gililov	1999	DG 458 677-2 GH
Bengtasson / Kavtaradze	1999	DACOCD 516
Isserlis / Hough	2005	Hyperion B000BOIWU0

Table 3.1.2. Brahms' cello sonata in F major op.99

Artists	Dates	Label
Casals / Horszowski	1936	HMV DB3059/62
Pleeth / Good	1940	Decca K.930-3: AR 4421-7 (CHARM)
Rose / Owen	1947	Pearl GEMM CD 9273
Mainardi / Zecchi	1952	Doremi DHR-7926-8
Fournier / Backhaus	1955	Decca 425 973-2
Rostropovich / Richter	1957	youtube
Starker / Sebők	1959	Apex 2564 69900-0
Piatigorsky / Rubinstein	1966	RCA Victor 09026 62592 2
du Pré / Barenboim	1968	EMI 7 63298 2
Tortelier / de la Pau	1978	EMI 50999 6 88627 2 5
Harrell / Ashkenazy	1980	Decca 414 558-2
Shafran / Gottlieb	1980	MELODIYA : C10 14787-88
Rose / Pommier	1983	Virgin Classics 7243 5 61417 2 8
Rostropovich / Serkin	1983	DG 410 510-2 GH
Isserlis / Evans	1984	Hyperion CDA66159
Yo-Yo Ma / Ax	1985	RCA RCD1-7022
Yo-Yo Ma / Ax	1992	Sony 48191
Starker / Buchbinder	1994	RCA 09026 61562 2
Bylsma / Orkis	1995	SONY SK 68 249
A Bekova / E Bekova	1996	Chan 9479
Harrell / Kocacevich	1997	EMI 5 56440 2
Schiff / Oppitz	1997	PHILIPS 456 402-2
Maisky / Gililov	1999	DG 458 677-2 GH
Bengtasson / Kavtaradze	1999	DACOCD 516
Isserlis / Hough	2005	Hyperion B000BOIWU0

Recordings of Brahms' cello sonatas were first reviewed in 1927 in *Gramophone*, a decade earlier than the first published review of Bach's cello suites. Record reviews of Brahms' cello sonatas began with Harrison/Moore's 1927 recording of the E minor sonata, which also received a second review in 1929. With the exception of some foreign renditions by relatively smaller record companies, particularly in the 1950s and again in the 1990s, most recordings were subsequently reviewed. Brahms' cello sonatas on record, therefore, provide an ideal guide to investigating how the focuses of record reviews have remained consistent or have changed.

The recordings selected for the investigation of the J.S.Bach suites are shown in Table 3.2.

Table 3.2. J.S.Bach solo cello suite BWV1007

Artists (cello)	Dates		Label
Casals	1936	[1997]	EMI CHS 761027 2
Casals	1954		Part 1: Prelude, Allemande, Courante http://www.youtube.com/watch?v=VhcjeZ3o5u Part 2: Sarabande, Menuet, Gigue http://www.youtube.com/watch?v=xBp_R_RcbEw

The early period of *Gramophone* celebrated Casals' contribution towards J.S. Bach's cello suites in several ways, by publishing the artist's own article entitled "The Story of My Youth" in 1932, followed by an article about the cellist as one of the Gramophone celebrities in 1932. A record review of his renditions of the Bach cello suites, however, was first published in 1938 as a section of Bach Society[50] News.

The recordings selected for the investigation of Prokofiev's cello music are shown in Table 3.3.

Table 3.3.

Table 3.3.1. Prokofiev's sonata for cello and piano in C major op.119

Artists (cello / piano)	Dates		Label
Rostropovich / Richter	1950	[1997]	EMI Classics 72016
Rostropovich / Richter	1955		Chant du Monde LDX 78388

Table 3.3.2. Prokofiev's "unfinished" solo cello sonata op.134

Artists (cello)	Dates	Label
Isserlis	1989	Virgin Classics VC 7 90811-2
Ivashkin	1996	Ode Records MANU 1517
Wallfisch	1999	Black Box 1027
Ivashkin	2002	Chandos CHAN 10045

[50] The Bach Society was formed by HMV in 1934 and since Bach was considered a specialised area, any recordings could only be obtained in a limited "Society" edition.

3.2. Changing from work to performance

I examine at which point of history the reviewers' focus changes from the work to the performance. In the case of the Brahms' cello sonatas, critics' initial focuses in the pre-WW2 era were on reviewing both the musical work and the recorded music, with lengthy discussions of the works. By the 1950s, critics' focuses on the musical works had moved to comparisons of multiple performances on record.

- **Brahms sonatas on record**

1925-1945

The history of record reviewing in Britain can be traced back to 1923, with the founding publication of the specialist magazine *Gramophone*. As can be suggested under the headings of *Analytical Notes and First Reviews,* pre-WW2 record reviews focused on two aspects, both the musical work and the recorded music. The record reviews were quite short in length (i.e. less than 200 words) in the 1920s, with relatively lengthy remarks given to the musical works, leaving limited space for the recorded music. By the 1940s, the reviews became longer (i.e. up to 1000 words), although the focus of the reviews remained the same.

Due to the limited capacity of 78-rpm records, artists tended to record short encore pieces rather than longer works such as full length sonatas or concertos, and in rare cases they had to act upon record music merely to fill-up the disc.[51] Contrary to post-WW2 artists who recorded the two Brahms cello sonatas on one disc, artists recorded one sonata each; Harrison, Feuermann and Piatigorsky the first sonata and Casals the second sonata in the 1920s to 30s and Pleeth the second sonata in the 1940s. The artistic tendencies of recording just one sonata in the pre-WW2 period might relate to the limited capacity of 78-rpm records.

Record reviews of the first cello sonata in E minor op.38

Given the unidentified critic's (C.J.) remark that the *E minor* sonata is one of the significant cello sonatas in music literature (1927: 17), it can be suggested that it might not have been considered as one of the crucial concert repertoires by the time of the record review. C.J. (1928: 17) pointed out that although he found the performance by Harrison / Moore

[51] An unidentified reviewer in 1926 wrote how Casals had to play the transcribed work of Schubert's charming piece op.94, No.3 in F minor twice to fill even a 10 inch disc.

attractive, he would have enjoyed it further with a slightly wider "range of colours" from Beatrice Harrison's playing. His remark about the range of "colours" from the cello can be suggested to derive from a relatively narrow range of contrasting mood and character as expressed by dynamics and/or tone colour (timbre), from which he perceived Harrison's cello playing to be a flat performance. Although he did not provide many details as to why he felt that the piano playing was remarkable, credit was given to Gerald Moore's "fine playing of the piano part". The balance between the two instrumentalists was pointed out as being at some moments like "heavy ice" in the allegro ma non troppo (first movement), which eventually resolved with a much more characteristic and stylistic closing. Although C.J. has remarked that the Harrison/Moore was a good quality recording and that he was appreciative that the work had been recorded, the tone of the review itself could be perceived as rather off-putting, particularly regarding the contribution of the cellist. On the contrary, the Harrison/ Moore rendition sounded much more convincing to Alec Robertson (1929: 11). Robertson perceived their performance as "delightful", because of the "neat and precise" playing and extremely well recorded piano tone (1929: 11). Robertson drew attention to the marvellous communication between the two instrumentalists in the development section of the first movement, remarking that the cello's downward arpeggio chords reinforced the piano's fortissimo chords spectacularly. Robertson's favourite moment in the Harrison/Moore disc was the second movement, "with its joyous theme and fanciful trio". However, given his comments focusing on how he perceived the sonata as a work, it is unclear which element in Harrison/Moore's playing could have resulted in Robertson's particular enjoyment.

Robertson (1935: 18) also reviewed Feuermann/Van der Pass' recording of the E minor cello sonata. He praised how Brahms managed to "exploit the range and personality of the cello", an instrument "lacking sufficient suppleness and variety of tone". To Robertson, Feuermann's strength and virtuosity shone particularly well in the last movement, whereas the critic would have preferred to have had more contrasting tone between the first and second subjects of the first movement and "more light and whimsical" tone in the Trio. Robertson also remarked that due to casting the right character in the Trio, Beatrice Harrison's recording was much preferred to that of Feuermann.

William Robert Anderson's review of Piatigorsky/Rubinstein (1940: 9) began with an overall view of how the Brahmsian philosophy was efficiently projected in "an epitome of the cello's noblest numbers", the E minor sonata. Piatigorsky/Rubinstein's playing was regarded as a top-notch partnership. To Anderson, Piatigorsky's every detail and nuance provided a valid experience to the listener, whilst Rubinstein's playing was crisp and clean. Anderson's

closing remarks were that he was aware of Robertson's review of the Feuermann/Van der Pass duo in 1935 and that he believed that Beatrice Harrison's earlier recording was worthy of a second review.

The focuses of pre-WW2 record reviews of Brahms' first cello sonata in E minor were on the musical work, such as discussion of the significance of repertoire in music literature (CJ 1928), Brahms' contribution to exploiting the range and personality of the cello (Robertson 1929) and the projection of Brahmsian philosophy in the work (Anderson 1940). However, Robertson's (1935) mention of Harrison / Moore's interpretation in the review of Feuermann / Van der Pass and Anderson's (1940) final remark on Feuermann / Van der Pass and Beatrice Harrison in the review of Piatigorsky / Rubinstein indicate that the focuses in record reviews may have been about to change.

Record reviews of the second cello sonata in F major op.99

Recordings of Brahms' second cello sonata in F major include Casals/Horszowski's 1936 and Pleeth/Good's 1940 recordings. Both were reviewed in 1940, Pleeth a month later than Casals, in the sections under the heading of *Analytical Notes and First Reviews* in Gramophone.

Suggesting that a study of the score of the op.99 as a procedure in the recording review was necessary, Robertson (1940a: 13) paid special attention to the op.99 sonata as a musical work in his review of Casals / Horszowski. Robertson explained that his reason for studying the score concerned an unnoticeable immediate attraction in the F major sonata, i.e., unlike the Minuet movement of the E minor. His study of the score was aimed at educating potential buyers of the disc and therefore he kept his discussion of the score more narrative and descriptive in nature, rather than analytical. It is something of a pity to notice that his account of the score reading was rather detached from his review of the recording. For instance, although he mentioned Brahms' fuller coverage of the range of instruments in the mature work for the cello (the op.99 F major sonata), he hardly considered how the artists in question executed the fuller instrumentation range in performance. He also remarked that

> The beauty of [Casals'] tone and phrasing, the deep feeling of the slow movement, after the drama and passion of the first movement, and the rhythmic vigour and charm of the last two movements leave one lost in admiration. The recording of the cello is exceedingly good throughout: often, indeed, as I have said, of startling fidelity (p.13).

Although it appears that the critic appreciated the cello playing of Casals, it is unclear what extent of Casals' interpretation the critic perceived as "the drama and passion" of the first movement and the "deep feeling" of the slow movement, partly because the descriptions of the actual performance are too brief. He added that

> Unfortunately the splendid co-operation of the pianist is not so well recorded. The bass of the piano is weak and one is conscious of a certain sense of strain in trying to hear more clearly what he is doing. The players are so evenly matched in artistry – their co-operation is intended by Brahms to be on equal terms – that it is a great pity this matter of balance was not better adjusted (p.13).

In spite of the well-matched artistry between players and the well-intended ensemble balance,[52] the actual balance did not sound appropriately well adjusted. Robertson also perceived that the role of the piano in the duo was rather weak; he was uncertain whether the faults lay with the pianist or with the balance problem caused in the recording studio. He closed his review by judging that, on the basis of his account of the performance of the first two movements, he would highly recommend this recording, because "for cellists a performance of this high quality will be a priceless boon".

Robertson (1940b: 10) began his review of Pleeth / Good in a sympathetic voice, mentioning how unlucky it was for young artists that the reviews of the same repertoire had appeared at the same time as the magnificent Casals / Horszowski interpretation. Robertson remarked that a balance problem occurred in the opening movement in Pleeth / Good; that is, the pianist's throwing herself into the opening movement meant that the cellist was heard "in the background". Robertson found it particularly problematic, as the score indicates the dynamics of the main theme to be forte for the cello and piano for the piano. The critic also remarked on "the lack of romance in the cellist's lower notes". The slow movement was played sensitively, although some details might not have been included. The codetta seems to be the favourite of the critic, and he wished that Pleeth / Good' s playing of the entire sonata had been of that standard. Robertson hardly discussed the F major sonata as a musical work in the review of Pleeth / Good, so focus was given to the interpretation. It can be suggested that although there was no direct comparison between the two duos, the review of Pleeth / Good could have been overshadowed by Casals / Horszowski's already established

[52] That is to say, Robertson claimed that the ways in which tremolos were executed for piano and later for cello in the development section show how excellent the ensemble balance had been intended to be.

reputation, as well as the greatness of the interpretation, rather than Pleeth / Good simply not being in "their [usual] form," as Robertson suggested.

As with the E minor sonata, the focus of the record review remained the musical work in the case of the F major sonata in the pre-WW2 era. Robertson (1940a) mainly considered the F major sonata as a musical work in his in-depth discussion in his review of Casals / Horszowski. He indeed did not remark on the musical work in the review of Pleeth / Good, but with his review of Casals / Horszowski a month previously, he probably felt that his intended readers would now be aware of his view of the F major sonata as musical work. Robertson (1940) highly recommended Casals / Horszowski, whereas he showed some reservation towards Pleeth / Good. The landmark recordings of the era appear to be Beatrice Harrison's rendition of the E minor sonata and Pablo Casals' version of the F major sonata.

The 1950s reception of the Brahms cello sonatas on record: Fournier, Starker, Tortelier and Rostropovich

With the availability of less costly LPs, more artists were signed for recording contracts in the 1950s. Brahms' cello sonatas, in particular, were popular choices for recordings. Some artists recorded them more than once with an interval of between five and twenty years.[53] Partly due to the availability of several renditions of the repertoire, the focuses of record reviews have indeed changed from the 1950s up until now.

In 1955, Roger Fiske compared a number of recordings with an equal level of significance.[54] Fiske (1955a: 50) compared the two contrasting interpretations of the two Brahms sonatas by Tortelier and Starker: unlike pre-WW2 critics, whose main concern was the question of balance, Fiske showed more interest in different interpretative issues provided by the cellists. He stated that in the E minor sonata, Starker gave "fire and precision" by attacking it "with an urgency", whereas Tortelier quietly provided a "dreamy nocturne" , with a rather slow tempo. In the F major sonata, Starker provided a lively performance at the cost of missing "the poetry", whereas Tortelier's golden sound provided another level of beauty. Fiske's reviews provide readers with a balanced guide to choosing recordings depending on what kind of Brahms they had in mind. The final sentences of his review sum this up: "Starker is your man if you like Brahms played with fire and precision, Tortelier if you like a

[53] Such examples include Fournier, Tortelier, Starker, Rose, Rostropovich, Ma, Harrell and Isserlis.
[54] As mentioned earlier, the pre-WW2 critics also introduced some renditions other than the one they were evaluating. However, a comparison of different renditions with an equal level of significance was a relatively fresh development of the post-WW2 period.

dash of sentiment. Both are very good, and both are very well recorded." (p. 50). Eight months later, Fiske (1955b: 61) reviewed Fournier / Backhaus playing Brahms' cello sonatas and made a comparison with Starker and Tortelier. The critic remarked on the merits of Fournier / Backhaus' excellent piano quality and good balance. He also perceived that Fournier's mellow lyricism suited the work well. He pointed out that whilst Fournier's highs on the A string "lack bite", the cellist's tone on the lower strings was beautiful. Although he lacked Starker's virtuosity, Fournier's sweet lyricism was perceived as charming. Fiske built up his reviews of Brahms' cello sonatas from his previous knowledge of Starker's "phenomenal technique" (1955a: 50), and Fournier's well-blended "lyricism" (1955b: 61), which contrasted with Tortelier's sentimental poetry and more emotional response. Some details, including Fournier's rendition which omitted repeats, were also mentioned.

William Mann (1959: 62) reviewed Rostropovich's recording with Dedyukhin.[55] He commented that although the Brahms cello sonatas were technically demanding pieces for the cello, Rostropovich made "the music sound inevitable", which no other instrument would have managed. He mentioned that although he also admired Fournier's version, Rostropovich sounded "more real and most inspired". The only pity was how the record was laid out, as the fourth movement "spill[ed] over on to side two".

By the 1950s, the focuses of record reviews moved from being score-oriented to performance-oriented: multiple renditions were discussed and compared to one another. Interpretative variances in recordings of equal merit by 1950s artists allowed the critics to provide consumers with a choice from a wide range of available recordings depending on what kind of Brahms consumers might prefer.

Another noticeable issue in record reviews is the exclusion of reviews of recordings issued by either foreign or relatively small companies, whereas records issued by big companies were all reviewed. This can be suggested as an industrial association between *Gramophone* and big recording companies such as EMI, Decca, DG and Philips, rather than the promotion ofng artists of merits. This problem is most evident in the post-WW2 1940s to 1950s, when Rose / Owen (1947) and Mainardi/Zecchi (1952) with the F major sonata and Gendron / Francaix (1952) with the E minor sonata were not reviewed, despite their high qualities of technical display and interpretative insights.

[55] Rostropovich's most recognised Brahms cello sonata recording is his 1983 rendition with the pianist Serkin. The cellist, however, recorded the F major cello sonata with Dedyukhin in the 1950s and the cellist's live concert with Richter in Russia in 1957 was recorded, and is available through Youtube.

- **Other repertoires**

In the case of the Bach cello suites, reviews began to appear at the slightly later date of 1938. Owing to his achievement of establishing the Bach cello suites as a concert repertoire instead of a mere academic exercise, the focus of record reviews of the Bach cello suites was on Casals himself and the performances, rather than on Bach's musical work. As for the Prokofiev cello sonata, although the work was unfamiliar in 1960 in the West, rather than considering the music’s structure, critics made a lengthy discussion centred on historical information about and around the work, with reference to the sleeve-notes of the record.

3.3. Changing tastes in performance styles

- **Brahms cello sonatas on record**

The question of when tastes in performance styles changed will now be evaluated. Critics found it awkward to accept interpretations beyond Brahms the classicist until the 1960s, but their views became more neutral after du Pré / Barenboim's record release. By the 1970s and 1980s, critics were no longer looking for Brahms the classicist and showed their preferences for romantic flexibility.

The 1960s: changing tastes, from Fournier to du Pré

The changing focus of record reviews emerged in the 1950s, which considered multiple renditions, and continued during the 1960s. Fiske compared his record review of Navarra / Holecek (1962: 1) with Fournier/Backhaus and Rostropovich/Dedyukhin, whereas Starker's second recording with a different pianist, Sebők, (1963: 82) was evaluated in comparison with Fournier/Backhaus. Navarra's playing was perceived by Fiske to show that the artist "loves the cello [and] Brahms" (1962: 1) in a heartening romantic way. Navarra's tempo is slower than Fournier in the minuet of the E minor sonata, which nonetheless sounds convincing, as it "allows the instrument to speak in the quicker passages". Somehow Fiske found that Navarra's rendition was not as attractive as Fournier's in general and Navarra's pianissimo was not as "breath-taking" as Rostropovich's in the F major sonata. All things considered, Fiske recommended the disk by Navarra / Holecek, if "fullblooded romantic playing" of Brahms were the consumer's choice. Fiske believed that Starker's second recording of Brahms with Sebők was "as wonderful as ever" (1963: 82) because of its warm and full tone, precise technique and appropriate expression range for Brahms. Fiske found that although Fournier was slightly better balanced than Starker, the critic remarked that Starker was "preferred to the Fournier because of its cheapness".

Joan Chissell reviewed du Pré/Barenboim (1968: 76) in comparison with Fournier/Backhaus (1955) and Fournier/Firkusny (1967). She provided critical insights into both Fournier recordings: the 1955 one with Backhaus "though mellow, is backward and muzzy", whereas the 1967 one with Firkusny is "brighter and clearer, but uncharacteristically cool" (1968: 76). In those respects, Chissell believed that just for the recorded sound by itself, du Pré/Barenboim was better than either of the Fournier recordings, although du Pré and Barenboim might "tear a reviewer in half" with extremely expressive beauty on one hand and being "self-indulgent enough in rhythm and tempo to be un-Brahmsian" on another. By

the term “un-Brahmsian”, the critic explained that the use of rubato in Brahms interpretation should accompany thoughtfulness towards the composer's score. She found that EMI engineers managed “the right richness and warmth for Brahms without loss of clarity” (1968: 76). Chissell remarked that du Pré and Barenboim favour considerably more leisurely speeds in the E minor sonata than Fournier, which she commented was “near funereal tempo” (1968: 76) in the first movement. Even in her preferred second movement interpretation, the reviewer was somewhat disturbed by the emphasis on details rather than a longer line and an introduction of a substantial ritenuto in the Trio. Chissell found that the cellist’s rhythm and tempo “extract the very last drop out of every single note” of the two sonatas in her own way and that the pianist, who does not do these things as much in his solo recordings, also showed similar rhythmic behaviours. She blamed the cellist for influencing her pianist. The “rhythmic behaviours” were highlighted more in the E minor sonata rendition. The du Pré/Barenboim duo’s F major sonata performance was clearly Chissell’s preference over the E minor one, even though it also contained “leisurely tempi, with intense and richly eloquent characterisation of detail often at the expense of the broader flow and larger design” (*Ibid*.). Chissell believed that performers can have more space for exaggeration in the execution of op.99, because the piece was written in the period when “inhibitions had been broken down”. She observed that the F major sonata’s “more overt romanticism” accommodated the duo’s interpretation style efficiently. Although they did not effectively project the music’s spirit in comparison to Fournier, the critic concluded her review by reiterating that no artists could transgress more beautifully than these two. It seems that on the whole Chissell has also been taken by the romantic interpretation of du Pré/Barenboim. However, since her previous experience of the work was largely based on Brahms the classicist, she found herself in the awkward position of announcing that the experience of romantic Brahms is as magnificent as the classical one.

Anderson (1969) remarked that du Pré’s Brahms with Barenboim (recorded in 1968) shows “an eloquence and subtlety of vocabulary that only the finest minds in music ever attempt” (p.163). Whilst the critic applauded the cellist’s brilliance in spreading “sunset colours” over Brahms, he equally admired Barenboim’s artistry. To him, each movement and section was “imagined with a detailed care that constantly reveals new beauties, and yet both works emerge with their architecture the more impressive for the subtle and inspired investigation to which it has been subjected” (p.164), although the minuet from the E minor appears to be the movement most preferred by the reviewer. Anderson observed that the choice of tempi appeared to be intentional, which leads the listener to the new majestic

version of “unfold[ing] Brahms” (p.164).

1960s critics continuously refer to a few 1950s recordings as comparison materials in their record reviews; the most frequent 1950s reference disc was Fournier/Backhaus, which suggests that critics perceived Fournier’s version as the landmark recording of the decade. On the arrival of du Pré / Barenboim’s romantic rendition in 1968, Fournier/Backhaus was called “backward and muzzy” (Chissell 1968: 76), which indicates that a changing view of landmark renditions was about to occur. du Pré/Barenboim’s romantic insights of Brahms had come as a pleasant surprise to the musical circle, and was eventually accepted as another way of interpreting Brahms.

The 1970s: re-issues of the “classics”

Re-issues of the “classics” emerged in the 1970s. Max Harrison reviewed a re-issue of Fournier/Backhaus (1976: 102). Harrison perceived that although Fournier/Backhaus might “not have great life or resonance” (1976: 102), with Fournier’s lack of variety in tone and Backhaus’ rather unimaginative story, the rendition sounded extraordinary considering its first appearance had been more than two decades previously. Harrison’s evaluation can be suggested to be the same as Chissell’s view of Fournier/Backhaus: somewhat “backward and muzzy” (1968: 76).

In contrast to the pre-WW2 reception of Casals’ 1936 recording, when it was described as a cello performance of high quality, the 1977 review of the same recording provided a contrasting view. That is, although the cellist’s total control of the slow movement might also have been appreciated in the 1970s, Casals’ 1936 Brahms’ F major recording was not admired by Anderson (1977) overall. The critic’s evaluation firmly condemned the cellist’s rubato in the scherzo movement, which apparently was not managed effectively. It is noticeable that a good balance between the two players was perceived as a credit to the pianist’s contribution rather than as teamwork. It is interesting to notice how Horszowski’s playing and balance issues were perceived as problematic in the pre-WW2 period, because the same aspects were considered admirable in the 1970s. Anderson critically commented on the cellist’s cautious approach towards interpretation. This was seen as “worrying” the music, and it can be anticipated that Casals’ rendition may have been found to be too careful, observant and “classical”. Whilst he clearly views Casals’ “classical” version of Brahms as unsatisfactory, quoting his conversation with the cellist Corredor he points out that Casals’ view of Brahms was “strict classicism” (p. 826). Having said that, if Casals’ intention in his

interpretation of Brahms was one of "strict classicism" to Anderson, one can view Anderson's criticism as evidence of how the cellist's intention towards interpretation was efficiently delivered.

It is strange to note that Anderson, who was critical of Casals' Brahms, finds Piatigorsky's Brahms' F major sonata recorded in 1960 far more commendable. Anderson's review seems to be influenced by the memory of the cellist, who had passed away the year before. Anderson, however, criticised the shaping of a certain movement in each sonata rendition, such as the Piatigorsky/Rubinstein duo's fugal finale of the E minor sonata and the first movement of the F major, which he perceived as no better than any "average" cello/piano duos on record. But overall, Anderson felt that with the effort of the pianist, the large-scale "Brahmsian eloquence" was effectively projected by the Piatigorsky/Rubinstein duo, with the powerful and passionate commitment of the involved musicians, and without "exaggeration or mannerism".

Chissell (1977: 58) also reviewed Piatigorsky/Rubinstein by comparing them to du Pré/Barenboim. The critic began the review with how she was taken by du Pré/Barenboim in spite of their "elasticity in phrasing" back in 1968, especially their rendition of the F major sonata. Chissell remarked that du Pré used more expression than Piatigorsky, including vibrato, which often resulted in luminosity in the cantabile section. Piatigorsky was "less concerned with detailed nuance", which achieved "the underlying solidarity of backbone". She confessed that it was hard to make "a clear-cut recommendation" between Piatigorsky / Rubinstein and du Pré / Barenboim, so suggested buying both magnificent versions of Brahms.

Chissell evaluated Tortelier's second recording of the Brahms cello sonatas, this time with his daughter Maria de la Pau (1978: 101). To Chissell, Tortelier's interpretation of Brahms emerged as "more classic than romantic" when compared with du Pré/Barenboim. Differentiations included the use of vibrato and phrasing: Tortelier does not place as much vibrato as du Pré "at emotive moments" and Tortelier/de la Pau also emphasise the longer line and flow, whereas du Pré/Barenboim try to make every individual note speak. Chissell found that both cellos have equal merit, but she preferred Barenboim's piano sound. She remarked that since "Brahms was not the dry old academic", Barenboim's interpretation was also totally acceptable and invaluable, but if consumers were to prefer Brahms the classicist, "Tortelier and his daughter are the answer".

Re-issues of "classics" received rather harsh reviews in the Gramophone: Fournier/Backhaus was considered as "not hav[ing] great life or resonance" (Harrison 1976:

102), whereas Casals / Horszowski's classical Brahms sounded as if it were "worrying" the music (Anderson 1977: 826). Referring to Casals/Horszowski, it was considered that "for cellists a performance of this high quality will be a priceless boon" (Robertson 1940a: 13) and that Fournier's mellow lyricism suited the Brahms cello sonatas well (Fiske 1955b: 61). At the time of release, it can be suggested that the ways in which critics evaluated Brahms may have changed due to the availability of newly released recordings. The two contrasting interpretative styles, classical and romantic Brahms, were discussed widely during the 1970s. du Pré/Barenboim's romantically flexible Brahms, in particular, was highly recommended, which shows that by the 1970s critics had not only come to terms with the co-existence of classical and romantic Brahms, but had also begun to prefer the romantic version over the classical.

The 1980: new releases and Grammy awards

The 1980s was an exciting time for the Brahms cello sonatas on record, including the two Grammy awards and a few excellent releases. Chissell (1981: 82) evaluated a new release by Harrell/Ashkenazy in comparison with du Pré/Barenboim and Tortelier/de la Pau. The critic confessed that she would "never part with" du Pré/Barenboim, which indicates she already had a firm favourite; she praised how the artists managed to make every note speak with "intense and richly eloquent characterization of detail," even at the cost of working against the music's flow. She believed that the Tortelier/de la Pau project sustained a sense of direction beautifully, reflecting classical Brahms. Although the pianistic quality of de la Pau does not quite reach Barenboim's, the artistic insights of Tortelier/de la Pau are equally commendable to du Pré/Barenboim. She also recommended Harrell/Ashkenazy for the first time buyer of the work, because of "the variety of Brahms's textural invention", Harrell's witty phrasing of the E minor sonata's Minuet and Ashkenazy's energetic piano playing. With a slightly faster tempo than that of du Pré/Barenboim, Harrell/Ashkenazy's tempo flows better with the works.

Ivan March (1983: 62) claimed that Rostropovich/Serkin's recording of the Brahms cello sonatas revealed the cellist's expansively rich and resonant tone and "larger than life" musical personality. The location of the microphone perhaps made Rostropovich sound dominant in balance; the recording was projected as a rich flood of cello sound and was more reticent in timbre from the piano. Brahms' bold melodic lines and the duo's responses to each other were well projected. Perhaps due to the fact that Rostropovich/Serkin's is the first ever

Grammy awarded performance for the cello, the recording has lately became a popular choice for comparison with a new release after March's initial review.

Isserlis' debut on record was with the Brahms cello sonatas with Evans, and was reviewed by Chissell (1985: 77) in comparison with Harrell/Ashkenazy and Rostropovich/Serkin. She perceived that thoughtful musical insights and beautiful tone were displayed in Isserlis' playing. Chissell felt "an intimacy of style" from Isserlis/Evans which meant Brahms' meaning was explained to the listener at a personal level. In spite of a balance problem caused by the cellist's use of gut strings, Chissell highly recommended this disc. She found that Isserlis/Evans had more common with Harrell/Ashkenazy than "a more leisurely tempo in pursuit of romantic expression" by Rostropovich/Serkin. At the time of the CD reissue of Harrell/Ashkenazy, Chissell (1985: 77) evaluated Harrell/Ashkenazy in relation to Rostropovich/Serkin. She felt that "the warmly resonant" sound of Rostropovich/Serkin was not as refined as that of the Harrell/Ashkenazy disc, although the "full-bodied romantic" Brahms by Rostropovich/Serkin was as convincing as Harrell/Ashkenazy.

Ma/Ax's rendition was considered by Chissell (1986a: 70) in comparison with several recordings released in the 1980s, including Harrell/Ashkenazy, Rostropovich/Serkin and. Yo-Yo Ma was called a "refined and sensitive lyricist" and musical communication between the two artists appeared insightful, with phrasing and shading. The two artists play in a way that shows they love the music and they are "in the world to bask in its romance", although their tempo is often more leisurely than that of others. Chissell remarked that "the new RCA recording [Ma/Ax] is just as acceptable as the DG [Rostropovich/Serkin] and Decca [Harrell/Ashkenazy]" (1986a: 70). Her comment soon changed (1986b: 69). In spite of "Yo-Yo Ma's acute musical sensitivity and sweet, singing tone", she highly recommended the "potently characterful, clearly recorded" Harrell/Ashkenazy and much more "romantic and closely and succulently reproduced" Rostropovich/Serkin. She stated that her choice of the two earlier recordings was due to missing "a strong, continuously sustained Brahmsian sense of direction" in Ma/Ax.

Shortly before his death in 1984, Leonard Rose recorded his final renditions of the Brahms sonatas in 1982, which were digitally reissued in 1989. He made a number of recordings throughout his life, but the current study will focus on his 1947 recording of Brahms' F major sonata. Chissell showed her admiration for and sentimentalism towards the late cellist by remarking that "both performances are deeply searching with every small innuendo as it were rethought so as to reveal new shades of meaning" (1989: 56). However, she finds the tempo in the E minor is far slower than that of any of Rose's contemporaries,

such as Harrell and Rostropovich, and the minuet movement is especially perceived as too slow. The F major is "much more carried along on the music's own tide" (1989: 56). Nonetheless, having been complimentary throughout the review, Chissell clarified to readers that her preference firmly remained with Harrell/Ashkenazy and Rostropovich/Serkin.

The 1980s witnessed the two renditions by Rostropovich/Serkin (1983) and Ma/Ax (1985) winning the Grammy in 1984 and 1986 respectively, but they were not mentioned in any reviews. During the 1980s, critics rarely discussed either the music's structure or re-issues of the classics. Their focus was on evaluating the 1980s releases of the Brahms cello sonatas. Perhaps due to the fact that du Pré/Barenboim had already set up an example of experiencing romantic insights into Brahms, another romantic interpretation by Rostropovich/Serkin was highly recommended, together with the witty phrasing of Harrell/Ashkenazy.

An empirical study into the changing views of record reviews of the Brahms cello sonatas includes the identification of the landmark recordings of each decade. Notable recordings of the Brahms cello sonatas of each decade include from the 1920s Harrison/Moore's (1927) interpretation of the E minor; 1930s critics believed that Harrison cast the right character in the Trio compared to Feuermann. Compared to Casals/Horszowski's (1936) version of the F major, for instance, Pleeth/Good (1940) suffered heavily from having their record reviewed the month after Casals/Horszowski. Fournier/Backhaus (1955) marked the 1950s: Fournier's well-blended lyricism was compared with fiery Starker with precision and Tortelier's sentimental poem in 1955 and Fournier/Backhaus also played a "reference" role in the record reviews of the 1960s. du Pré/Barenboim's (1968) challenging romantic take on Brahms shocked critics at the time of release. The 1970s saw the release of Tortelier/de la Pau (1978), which was also highly recommended, but record reviews of the 1970s and 1980s seemed to still be under the magic spell of the du Pré/Barenboim rendition. The 1970s is remembered for re-issues of the "classics," including Casals/Horszowski and Fournier/Backhaus, which received harsh reviews because they sounded rather "odd" compared to their contemporaries. Amongst many new releases in the 1980s, Rostropovich/Serkin's (1983) romantic Brahms and Harrell/Ashkenazy's (1980) witty phrasing stood out. Both re-issues of "historical" recordings and second / third renditions by artists were well-received, but nothing seems to stand out over the others.

- **J.S.Bach cello suites on record**

From the era of early recordings up until the 1950s, the focus of record reviews of the Bach cello suites remained on Casals. This was partly due to his achievement of establishing the Bach cello suites as a concert repertoire instead of a mere academic exercise and also to do with the unavailability of other renditions of equal merit. The 1960s to 70s witnessed how critics compared multiple renditions and recommended their choices of complementary interpretations of Bach, alongside Casals' "classic" recordings. As remarked in the review of the 1989 EMI re-issue of his 1936-9 recording, Casals' interpretation of Bach had been considered as the "reference" for critics and cellists of any generation throughout cello performance practice on record and his "romantic" interpretation of Bach would always remain in the heart of Bach enthusiasts.

Pre-WW2 era

Casals recorded all six suites between 1936 and 1939 and the first set was released in 1936, comprising the second suite in D minor and the third suite in C major, a review of which appeared in June 1938. Alec Robertson (1938) remarked on his awareness of previously released C major recordings by Suggia and Harrison, but Casals' 1915-8 recording of the C major suite was not mentioned. He perceived the C major suite as "the most melodious and immediately attractive of the two works" (1938: 14), but also found that "the slow intensification of feeling in the opening Prelude to the D minor Suite and its sudden check" (Ibid.) were outstanding. The second set, suite No.1 in G major and No.6 in D major, was released in the same month that the review of the first set appeared in print. The record review of the G major and D major suites was published in 1939. Robertson (1939) believed that "the range and equality of tone are simply marvellous" (1939: 17), and also commended the cellist's magnificent readings of the Preludes of both suites. Robertson suggested that Casals' superb playing revealed how "the single melodic line as an agent for the expression of deep feeling as well as gaiety is triumphantly vindicated by Bach" (Ibid.)

In contrast to the reviews of the Brahms cello sonatas on record, Robertson had already provided accounts of the performance rather than discussing the music's structure back in the pre-WW2 period in his review of the Bach cello suites. It is regrettable that his insights into the other two earlier renditions were not provided. The pre-WW2 record review of the Bach cello suites revealed how Casals was received at that time. Based on the pre-WW2 reception of Casals' Bach, this study can be expanded into how the focuses of record reviews of the Bach cello suites would remain the same or change.

Post-WW2 era

1945 - 1959

Although the recording was issued in 1939, Alec Robertson's review of the final set, Bach suites No.4 in E flat major and No.5 in C minor, of Casals' 1936-9 recordings appeared in *Gramophone* as late as 1948; he wrote that the delay was inevitable because of the war (1948: 6). To Robertson, the Prelude of the fourth Suite sounded rather like "a technical exercise" in the opening, whereas Casals' handled dotted rhythm in the Sarabande was "amazingly expressive" and the phrasing of a melodic line of the C minor Sarabande was also floating around his "mind's ear". Casals' superb playing and shape, including "the light and shade," the use of rubato and "the noble expression" (1948: 6) bring life to the music. It is noticeable that although Casals' recordings of Bach may not have been compared with other renditions by other performers, Robertson provides a deeper account of the performance than in the pre-war period and focuses on the ways in which the cellist handles musical expression as shape. The review was written after Casals' announcement of his refusal[56] to play in England and Robertson remarked that "the finest fruits of his great art" could remain within us through "these really splendid recordings". Given Casals' refusal to play in England in 1945, record buying was the only choice to experience Casals' art and critics subtly encouraged the public to buy records as they provided nuances and could bring a similar artistic experience to attending a concert.

From the 1950s, other cellists challenged themselves to record the Bach cello suites, and most were subsequently reviewed. For instance, the 1952 review of Starker also began with Casals' contribution towards the Bach cello suites as concert repertoires. Lionel Salter suggested that Starker's rendition put Casals' recorded performances in the shade in spite of their historical significance (1952: 22), although he did not compare Casals' rendition with Starker's in detail to back up his claim.

Denis Stevens' (1958) review of Casals' 1936-9 recordings of the Bach cello suites is written in a similar manner to Robertson's 1948 review. Stevens discussed how Casals had brought "life" to the suites and made his contribution to the concert repertoire,[57] even though

[56]By 1936, Casals' primary focus had become the Spanish Republic and he refused to play in countries that recognised Franco's government: the announcement was made in England in 1945 through the BBC, by playing a Catalan folksong called *El Cant dels Ocells* (*The Song of the Birds*). When Britain recognized Franco's government, Casals decided he could no longer play in the country.

[57] That is, Casals astonished the British concert promoters by including the entire C major Suite in one of his programmes (1958: 21) in the early twentieth century.

the works had formerly been regarded as purely academic in interest until the time of the cellist's visit to England then 50 years ago. In Stevens' opinion, the solo cello suites sounded like "a monument to be studied, learned by heart, communed with, and made a part of oneself" (1958: 21) when "Casals plays them", since the cellist's "interpretation is a classic in the best sense of the word" (Ibid.). According to Stevens, Casals handles the melodic turns of the suites so skilfully, "stressing the important notes slightly, or dwelling on notes essential to the underlying harmony" (Ibid.). It can be suggested that by leaving readers to wonder about whether Casals' emphasis of notes on melodic lines or underlying harmony occurred through accentuating or lengthening rubato, the critic subtly encouraged the readers to want to listen to Casals by buying the disc. Stevens also praised the presentational side of the disc, such as the transfer to LP and the booklets.

With the availability of another rendition, that of Starker, interest in other artists was also shown. In comparison with the pre-WW2 period, the main focus of record reviews of the Bach cello suites in the 1950s, however, continued to focus on the art of Casals' interpretation, although a much fuller account of Casals' shaping of musical expression has been discussed.

The 1960s-1970s

Stevens (1960) reviewed the 1957 recordings by Gaspar Cassadó,[58] whom Casals had taught. Cassadó's renditions were compared with Casals', as well as the recently released Starker recording by Columbia. Stevens perceived that Cassadó's interpretation was, "in general, less wayward than Casals" (1960: 42), because Cassadó took much steadier time in the quicker dance movements, giving an impression of baroque bonhomie. Cassadó's intonation is precise and his tone is "pure and beautiful" (Ibid.). He was, however, disappointed in how the Vox engineers seemed to have managed to produced a "bathroomy" sound from the fine tonal quality of the artist.

The record review of Fournier (Salter 1962: 51) began with how Casals had contributed to making the Bach cello suites (formerly of theoretical interest only) concert repertoire sixty years previously, and showed how delighted the critic was to see five

[58] Unlike Casals, who withdraw from playing in countries friendly to Franco's Spain, Cassadó continuously gave concerts in Franco's Spain and Nazi Germany, which brought Casals's public dismissal (1949) of his one-time pupil in the New York Times. This eventually made the young cellist lose his recording contract with Columbia and his concert career was cut short in the U.S. (Chaitkin, 2001).

complete recordings (including those of Cassadó, Starker and Fournier) of the suites at the time. Discussion was focused on comparing Fournier and Starker, on how Fournier's G major Prelude did not "ripple off the bow" (1962: 51) and how his Gigue sounded heavier in spite of a more incisive speed than that of Starker. The critics became eager to discover what the most current rendition was of the time, which may have put Casals in the shade. Given the last statement that "Starker still holds the field, though [Fournier] is a worthy contender" (1962: 51), Salter's choice remained with Starker.

Tortelier's Bach suites were comparatively reviewed in relation to Casals and Fournier in 1971. Stephen Plaistow remarked that "the only ones (for me)" showing sufficient stature as cellists are "Casals and Fournier" (1971: 72) but Tortelier joined them in the same class. Tortelier's Bach suite "does not replace Fournier's, who has his own excellence, but it's a fine complement to it" (1971: 72).

Casals' 1936-9 recordings appeared again in 1974, "with generally cleaner sound and much quieter surfaces" (Harrison 1974: 70), which allowed consumers "to catch so many of the nuances of Casals' playing" (Ibid.). Harrison perceived that the textures of light and shade in Casals' playing brought the music to life with a variety of tone and timing, which generally mirrors the similar views of the earlier reviews of 1948 and 1958. However, perceptions of Casals' interpretation of the first suite in G major differ in detail; whilst Robertson was taken by "the wonderful improvisatory prelude that opens the first suite" (1939: 17), Harrison admired "the impression of grandeur left by the Allemande" and "the Sarabande's profound meditation" (1974: 70) of the G major Suite

Harrison compared Casals' re-issue with Noel Taylor's interpretation, remarking that it was "bad luck" for Taylor that "his recording [was] issued the same month that Casals's reappears", since the young cellist is "an accomplished player with a large, unusually solid tone", who "shapes the music intelligently", such as in the Prelude of the D minor suite. But the critic found that it would be difficult for Taylor's disc to "fill a noticeable gap", with Tortelier, Fournier and Starker in the catalogue, and "with Casals back in circulation". Although renditions by Tortelier, Fournier and Starker were not reviewed, nuances indicated that they were of great quality.

Harrison (1977) reviewed an interpretation of the Bach suites by Honegger (a Casals pupil) in comparison with Casals and Tortelier. Although Harrison considered that Tortelier's Prelude of the first suite in G major was "more intense, more overtly nervous, than Casals" (1977: 70), who "inflects the line more romantically", Tortelier's recording represents the early 1970s excellently by enhancing the sound of Casals. The basic pulse in Honneger's

Preludes appeared more free (or less clear) than Casals and Tortelier. Harrison felt that if Casals were "one of the classics of the gramophone", Tortelier showed "the finest of current 'modern' versions" (1977: 70). Although Harrison found that Honneger was a player with strength, the critic felt that Honneger's rendition was "less imaginative". In the Allemande of the G major suite, he found that Tortelier's phrasing was clearer than Casals, whereas Honegger's execution was faultless, but also "emotionsless". Overshadowed by his predecessors' greatness, it can be suggested that Honegger did not receive a fair review. M.H. seem to be inclined towards Tortelier's modern take over Casals' classic version. Given that Fournier / Backhaus's particular brand of lyricism which was suitable for the Brahms sonata (Fiske 1955) only lasted until 1968,[59] Casals' 1930s renditions of the Bach suites lasted longer. In the 1960s70s, the focuses of record reviews moved onto finding what the most current "modern" version of the time could be.

Harnoncourt's 1960s-recorded Bach suites were reviewed in comparison to Casals and Tortelier (Duarte 1978: 83). Harnoncourt's use of a baroque cello of 1744 (Duarte 1978: 83) indicates that HIP (Historically Informed Practice) had already emerged. Duarte claimed that all three versions (Harnoncourt, Casals and Tortelier) "suffer some moments of dubious pitch (Harnoncourt least, Casals most)" and co-ordination problems between bow and string. To Duarte, Casals' rendition is heavily romantic with rubato and accent, whereas Tortelier is "'surprisingly less emotional" though "technically more assured" and Harnoncourt shows characteristic rhythm and phrases clearly, expressively and sensitively. The three contrasting renditions are "each valid in its own way" and finance permitting, all are worthy of possession; Duarte left the choice in the hands of the consumer, advising that choice "depends on which comes closest to your own view of Bach".

The 1960s to 70s was indeed an exciting time for Bach enthusiasts, with the availability of Casals' romantic Bach, Starker's fiery Bach, Fournier's mellow Bach, Tortelier's intense Bach and Harnoncourt's HIP Bach, which all have a charm of their own. The milestone change of focus in record reviews occur in the 1960s, when critics began to compare one rendition with another. Given that most music critics tended to include Casals' rendition, whereas the choices of second or third renditions changed, it can be suggested that Casals' 1936-9 rendition was considered as the benchmark interpretation. However, 1960s-70s critics also became eager to discover the most current rendition of the time that could be a complementary alternative interpretation alongside Casals' "classic" record. Subjective

[59] Fournier/Backhaus's Brahms was labelled as "mellow" but "backward and muzzy" (Chissell 1968) over du Pré/Barenboim.

evaluation played a crucial role in individual critics' recommendations of one Bach interpretation over another; for instance, Salter ' choice remained with Starker -- "Starker still holds the field, though [Fournier] is a worthy contender" (1962: 51). Plaistow considered that Tortelier's Bach suite "does not replace Fournier's, who has his own excellence, but it's a fine complement to it" (1971: 72). Harrison (1977) remarked that Tortelier's recording represented the early 1970s excellently by enhancing the sound of Casals, whereas Duarte left the choice in the hands of the consumer, between the "classic" of gramophone with romantic interpretation by Casals, the modern version with less emotion by Tortelier and Bach on the historically informed instrument by Harnoncourt. It can be suggested that with the availability of other equally magnificent interpretations of Bach, critics' focuses moved on to recommending their choices.

The 1980-90s

Lionel Salter remarked that "50 years ago, major works by Bach were considered to be of such specialized appeal that recordings could be obtained only in a limited "Society" edition" (1989: 132), but in the 1980s a dozen versions of the cello suites were available. He also pointed out that from the profound contemplative quality of the G major Sarabande to the raptness of the C minor Sarabande, "EMI's term "References" could not be more [appropriate], since these performances remain the classic yardstick by which all later ones must be judged". He also praised the masterful digital transfer from the original 78s, which brings a "clean ambience to the cello"

Reviews of re-issues of Tortelier in 1983 and Fournier in 1989 remarked on Casals' contribution in the early twentieth century, although critics' discussions were focused on the given recordings only. In the 1990s, although Casals' classic rendition was also remarked upon, comparisons were based on recordings newly released in the 1990s.

- **Record reviews of Prokofiev's Cello Music**

With reference to the distribution of recordings by Russian labels, record reviews of Prokofiev's cello music suffered from the Cold War. In the first recording reviews of Prokofiev's cello sonata op.119 in 1960 and the "unfinished" solo cello sonata op.134 in 1990, both works were introduced with a focus on historical aspects about and around the works rather than discussion of the music's structure. The main focuses of record reviews were on the performers of "special authority," Rostropovich and Richter, who both received very respectful and disapproving reviews in the Cold War period, but views on their "especial authority" and their Russian contemporaries became more favourable after the release of the EMI issue of Rostropovich: Russian Years.

Prokofiev's cello sonatas were written or completed in the Soviet Union during the Cold War period, the sonata in 1949 and the "unfinished" solo sonata in its current format in 1973. The Western rendition of Prokofiev's cello sonata in C major op.119 by Navarra/Holecek (1958) was reviewed in 1960, 13 years earlier than the 1955 rendition by premier artists Rostropovich/Richter, which was eventually reviewed in 1973. It can be suggested that the import of recordings by Russian record labels would not have been easy during the Cold War period.[60] Rostropovich's[61] authority on twentieth-century cello music, including Prokofiev, received some attention in *Gramophone* from 1986.

The Cold War period

The first record review of Prokofiev's cello sonata in C major op.119 that appeared in *Gramophone* was the recording by Navarra/Holecek from 1958; the review was published in 1960, together with the same artists' rendition of Beethoven's A major cello sonata op.69.

Salter (1960: 53) remarked that due to "extremely naïf passages, a gently lyrical style, fairly orthodox harmony, almost no trace of the old Adam except for a pale half-recollection of the Peter and the Wolf march", many would be puzzled on hearing of this "first recording" of Prokofiev's Cello Sonata. Prokofiev's Peter and the Wolf op.67 must have been the only composition that was well known to the West and therefore Salter would have expected to see more resemblances, which merely emerge briefly in the opening and ending of the second movement. Communication and distribution problems between the Communist and Western worlds during the Cold War period may have caused mistakes in the discography; that is,

[60] The melting of the Cold War began when the Soviet President Mikhail Gorbachev introduced the liberalizing reforms of perestroika (reconstruction) in 1987 and glasnost (openness) in 1985; the Cold War finally ended in 1991, when the Soviet Union collapsed.

[61] After Rostropovich settled in the United States in 1974, he was banned from the Soviet Union until 1990.

Navarra/Holecek is indeed the "first Western recording" of the work, but with the availability of a recording from the première (1950: first issued in 1997) by Rostropovich/Richter and another recording by premier artists from the Russian record label (1955), Navarra/Holecek is the third recording of the repertoire in a chronological sense. Salter also praises Navarra's well-shaped phrasing, perfect intonation and good tone, as well as Holecek's good ensemble partnership.

I mentioned earlier that when works were less known to musical circles, critics tended to discuss the music's structure rather than the performance, which was indeed the case of the Brahms cello sonatas on record. Prokofiev's cello sonata was an unfamiliar work in 1960 to the West, but rather than considering the music's structure, the critics made a lengthy discussion of historical information about and around the work, referring to the sleeve notes of the record. In spite of distribution problems of recordings by Russian labels, it seems rather odd to notice that there is no mention of Rostropovich's contribution as a collaborating artist in the compositional process, as well as a performer in the première. The main focus of record review was an introduction to the musical work, which usually fell into the historical aspects around the composition.

Two decades after the première and a decade after the review of the Western rendition, the 1955 recording by Rostropovich/Richter was finally reviewed, together with Saint-Saens' cello concerto. In the original review of 1973, Harrison remarked that "this work is packed with ideas on a particular level" and suggested putting aside "the especial authority Rostropovich and Richter bring to this composer" (1973: 11), which was unclear at time. Harrison (1977) later remarked, quoting his 1973 review, that Prokofiev's Cello Sonata "must stand against the especial authority of Rostropovich and Richter" (1977: 96), since they are poorly recorded. On the contrary, David Fanning much appreciated the same recording, remarking that "the classic performance of Rostropovich and Richter (Saga 5305, 11/73) found plenty of undertones in the sonata's prevailing introspection" (1988: 111). It can be suggested that focuses of record reviews have moved on to the performers of "especial authority" of the composition, although whether to respect or to disapprove of interpretations by "the especial authority" remained the individual critics' choices.

Post-Cold War (1990- Present)

The post-Cold War period began with Isserlis making the first step towards ensuring Prokofiev's "unfinished" solo cello sonatas were recorded. EMI's re-issue of Rostropovich's Russian years in 1997 excited critics, consumers and cellists.

Robert Layton reviewed Isserilis' recording of Prokofiev's unfinished solo cello sonata (1990: 39). Given how the piece was left at the time of the composer's death in 1953 and how the work had seen the light, R.L. considered in length how the work had assumed its current format and also praised Blok's contribution; stating that "the last half is pretty conjectural though it all sounds characteristic of late Prokofiev" (1990: 39). The only recording to date, Layton reviewed Isserlis' playing as being "with real flair and persuasion" (1990: 39).

Rob Cowan (1997) considered that EMI's 1997 issue of "Rostropovich - The Russian Years is the musical equivalent of a National Lottery windfall" (1997: 68), which included "the 1950 world premiere performance of Prokofiev's Cello Sonata with Rostropovich and Richter at their spontaneous best" for the first time. Cowan suggested that much of modern cello music was either commissioned by or dedicated to Rostropovich and that it was very unlikely to "encounter rival performances of the same repertory that are either as wholly compelling or more truly 'authentic'". Cowan found that the cellist's playing "subscribes to a familiar and distinctive interpretative formula, i.e. forceful tone-projection, prominent vibrato (distinctively wide and fast during softer passages), marked dynamic extremes, unstinting demonstrativeness and a comprehensive grasp of the score to hand". This EMI set of CDs has provided a chance to re-affirm the "the especial authority" of the selected twentieth-century composition for cello.

David Gutman (2003) reviewed Ivashkin's recording of Prokofiev's music for cello; the sonata for cello and piano was "a highly polished and deeply felt account" and the "nostalgic opening" of the "unfinished" solo cello sonata was also "brought off perfectly" (2003: 47). Elsewhere, Gutman remarked that he found "some of the skittish element so definitely rendered by the Russian pair" (2003: 56), which was very appropriate in Prokofiev interpretation.

By the late 1990s, with the issue of EMI's 1997 Rostropovich: Russian years, which included the 1950 première concert of Prokofiev's cello sonata op.119, focuses of record reviews became even stronger on the performers of "especial authority" than in the Cold War period. In the case of Prokofiev's "unfinished" solo cello sonata, the critics focused on the historical aspects around the composition, with brief remarks on how the work was performed.

3.4. Increasing sense of "historicisation" which comes through a longer time span (different formats), including HIP and early recordings

Re-issues of landmark recordings of previous decades were rather dismissed during the 1970s because of the somewhat old-fashioned playing styles. However, whilst welcoming the new additions of releases, historical nuances were also appreciated by the 1990s. For instance, why was there sudden interest in early-recorded materials in the 1990s, whereas there was very little in the 1920s? The reason is that by the 1990s, 70 years of the recording history had already been made.

The 1990s: "historical" re-issues and new releases

The record reviews of the 1990s included so-called "historical" re-issues and new releases, mostly second or third recordings of Brahms. "Historical" refers to early-recorded performances up to the 1950s.

Alan Sanders reviewed the re-issue of the Feuermann/Van der Pass duo's Brahms E minor (recorded in the 1930s) in 1990 and the Piatigorsky/Rubinstein duo's version (recorded in 1936) in 1992. He noted that this historical re-issue provided a rare opportunity for modern listeners to hear Feuermann's playing (1990: 120). According to Sanders, "lots of temperament, a superb technique and very sonorous, seductive tone-quality" are at the forefront in the cellist's playing of Brahms' first cello sonata, whilst not contradicting the work's "classical" elements, and the pianist is an attentive, assured ensemble partner. Sanders (1991: 200) commented on the transfer of the original 78-rpm for the CD re-issue. For instance, he noted how the transfer of a semitone high on Feuermann's recording of the Brahms E minor Sonata "spoil[ed] an otherwise good disc containing superb performances of the unusual". Sanders (1992: 134) remarked that Pearl's transfers did not quite reach the highest standards. He also suggested a style change in Piatigorsky the cellist between the pre- and post- war periods: the cellist "played with more generosity of tone and phrase" (1992: 134) in the pre-war period, illustrating a "wonderfully lyrical and poetic" (1991: 200) version of the Schumann concerto for instance, but in the post-war period his playing showed "less warmth than the earlier" (1991: 200). The critic commented that Rubinstein was at his best with Brahms (1992: 134) and the performance had a moving nobility of musical expression, great insight and much strength overall.

The Grammy winning artists Ma/Ax with their 1985 RCA recording of the Brahms

cello sonatas released a new recording of Brahms on Sony,[62] which later won their second Grammy. Given that Chissell (1992: 122), who evaluated Ma/Ax (1985) in comparison with Harrell/Ashkenazy, Rostropovich/Serkin and Isserlis/Evans, also reviewed Ma/Ax's second recording (1992), it is rather a pity that a comparison between the 1985 RCA recording and the 1992 Sony one by the same artists was not considered in the review. Chissell believed that Ma/Ax managed to keep the "classical tradition in favour of an [intensely] romantic" one in their interpretation of Brahms. She particularly enjoyed the cellist's insights into the slow movement of the second sonata, which provided "as intimate (and at times as ardent, even in its pizzicato) a love-poem as any to come from this composer's pen". Ma's sensitive phrasing and Ax's response to dynamics and textural colouring achieved "the eloquence of the music" at its best.

Janos Starker, who had already released two recordings of the Brahms cello sonatas in the 1950s, recorded his third rendition in 1994. Chissell (1994: 94) claimed that Starker's third recording of Brahms expressed the most vibrant tone of Starker on disc; the recording captured the cellist's occasional intake of breath and "emphatic finger-board-stopping, at moments of heightened intensity". The opening movement of the first sonata brings out the best ensemble and the classical connotations were respected rather too strictly in the minuet, whereas "nothing is under-nourished" in the second sonata. A re-issue of Starker's second recording (1959) of the Brahms cello sonatas was evaluated in comparison to his 1994 release (Chissell 1995: 77). Where the quality of the recordings was concerned, Chissell believed that the RCA (1994) recording was superior to the Erato issue (re-mastering of 1959). As for musical insights, contrasts between "the classical restraint" of the first sonata with "the romantic ardour" of the second were extremely well projected in his 1959 recording. That is, Starker was "as sparing with vibrato as rubato" in the E minor sonata, whereas in the F major sonata, "austerity is thrown to the winds". Although Starker's exceptional musicianship might be unquestionable in both renditions, Chissell felt that "increasing years have ripened and mellowed him as an artist".

Chissell (1996: 71) evaluated HIP (Historically Informed Performance) specialist Bylsma's Brahms sonatas on record. Amongst Bylsma's classical Brahms, she enjoyed the E minor sonata, because of its "purposeful sense of direction" and the delicacies of skills revealed through the interaction between the two instruments, whereas the Adagio of the F major sonata was perceived to be rather too fast for all the nuances to be articulated. Rob

[62] The Sony recording also included a transcribed version of the D minor violin sonata op.108.

Cowan (1998: 80) reviewed Schiff/Oppitz's Brahms cello sonatas in relation to Harrell /Kovacevich's 1997 rendition. He found that Schiff's vibrant pizzicatos in the opening of the Adagio affettuoso in the F major sonata could be what Brahms would have had in mind. He also enjoyed Schiff/Oppitz's elegant minuet in the E minor sonata, while he felt that Harrell/Kovacevich's version sounded more like a waltz. Of the two cellists, Cowan remarked that Schiff got his personal vote, because of "its song-like, musing qualities". He also reviewed Maisky/Gililov (1999: 69), which he compared with Schiff/Oppitz. Cowan remarked that in spite of expressive rubato, Maisky's phrasing line flowed well. The second movement of the E minor sonata was lightly pointed, whereas the pizzicatos in the slow movement of the F major sonata "set in at a brisk pace, with the tempo broadening only when the main melody line enters". Although his personal choice was still with Schiff/Oppitz, he highly recommended Maisky/Gililov, if anyone's high priority lay with "overt affection and warmth of expression" Duncan Druce (2006: 57) reviewed Isserlis' second recording of the Brahms cello sonatas with the pianist Hough. Druce remarked on Isserlis' 1984 recording with Evans, which was perceived as excellent. Druce pointed out that in Isserlis' 2005 recording of the Brahms, since the music flowed more effortlessly in spite of a similar tempo to his earlier rendition, the timings were almost always slightly shorter. Druce found that the latest addition provided a sufficient account with thoughtful playing.

The 1990s critics appreciated early-recorded performance style as a valuable historical source; for instance, in spite of differences in listening cultures between the early recorded era and the present day, CD re-issues of historical recordings by Feuermann and Piatigorsky were well-received. Artists' second or third renditions of the Brahms cello sonatas were not always considered in relation to their earlier renditions. The focus of record reviews in 1990s could be suggested as appreciating the history of recorded music, whilst welcoming the new additions.

3.5. Changing focuses of record reviews in cello performance practice

Changing focuses of record reviews in cello performance practice have been investigated with reference to the Brahms cello sonatas, J.S.Bach's cello suites and Prokofiev's cello sonatas. The reviews of the Brahms cello sonatas on record have indicated three changing focuses: on the work and performance, on interpretative preference and on historical nuances. Pablo Casals was the landmark figure in the reviews of the J.S.Bach cello suites on record and changing focuses were also centred around issues and re-issues of his playing. Record reviews of Prokofiev's cello music suffered from the Cold War: the main focuses of record reviews were on the performers of "especial authority," Rostropovich and Richter.

Changes of focus between the work-oriented and performance-oriented occur when musical works have become recognised amongst critics; in the case of Brahms, it was in the 1950s, the Bach cello suite pre-WW2 and Prokofiev's cello music in the 1990s. Interpretative preference for romantic Bach or Brahms or for the classical versions is caused by landmark recordings: changing views of landmark recordings indicate how tastes and preferences have changed, whereas the remaining view of benchmark recordings indicates the significance of rendition itself in music history. For Brahms' cello sonatas, changing tastes in performance styles are revealed in each decade, whereas the Bach cello suites and Prokofiev's cello music have the "especial authority" of Casals and Rostropovich/Richter respectively.

Appreciating or dismissing historical nuances could represent the social trends and expectations of the time. Record reviews can also be suggested to change in response to extra-musical changes in outlook, including the development of technology, the financial impact, such as the cost of discs, *Gramophone*'s association with the big recording companies and increases or decreases in the popularity of classical music. By the development of technology, I mean that early record reviews tended to cover short encore pieces, which could be related to the capacity of short duration records[63] and the availability of many renditions in the 1950s could have been caused by the development of less costly LPs. Regarding the financial impact, it appears that music critics throughout the century were largely concerned with the cost of discs (in relation to the income of consumers). For instance, the cost of discs worried an unidentified critic (K. K.) of Beethoven's "Archduke" Trio by Cortot/Thibaud/Casals, who claimed that artists played "like archangels" at "the price [of] arch" (1929: 17), whereas Fiske (1963: 82) considered both musical quality and the cost of discs when he made the recommendation between Fournier/Backhaus (1955) and

[63] I have explained this earlier with reference to Casals' playing of Schubert's op.94, No.3.

Starker/Sebők (1959). Another noticeable issue in record reviews appears to be the exclusion of reviews of recordings issued by either foreign or relatively small companies. This can be suggested as an industrial association between *Gramophone* and big recording companies such as EMI, Decca, DG and Philips rather than the promotion of artists of merit. This problem is most evident in the post-WW2 1940s to 1950s and again in the 1990s. By the rise or fall in the popularity of classical music, I mean that by the 1960s listening to music became a fashionable hobby for the new middle class (Day 2000: 107), whereas a decline in interest in classical music in Europe and North America (Cook 2009), especially among younger people, has led to the eventual decline of classical music criticism since the 1980s (Sandow 2007). It can be suggested that critics' attempt to seek an appropriate modern rendition of the time could occur in response to consumers' needs to be advised, whereas in the 1990s appreciation of historical nuances of early-recorded music could also have been caused by an attempt to hold the attention of the remaining young audience with regard to its value.[64]

This chapter has identified the trends of record reviews in cello performance practice, which in turn has shown how a detailed empirical analysis could be useful in responding to the findings of this chapter.

[64] Young music-lovers today may find it difficult to believe that 50 years ago major works by Bach were considered to be of such specialized appeal that recordings could be obtained only in a limited "Society" edition. The cello suites—nowadays available in about a dozen versions—had never been recorded until Fred Gaisberg, after protracted efforts, finally persuaded Casals to play them for HMV: nos. 2 and 3 in London in November 1936, the others in Paris in July 1938 and July 1939 (Slater 1989: 132).

Chapter 4

Brahms Performance Trends

This chapter aims to identify trends in musical expression in the performance of Brahms cello sonatas on record. A quantitative analysis of musical expression is investigated in twenty five selected recordings of the two Brahms cello sonatas. With the availability of multiple renditions by the same artists, this study will also attempt to pinpoint how the style of individual artists may remain or change in addition to identifying whether similarities in pedagogical and/or national style may exist.

4.1. Pedagogical relationships between the selected cellists

This chapter aims to identify the handling of musical expression in performing trends on record, including the pedagogical influence. Given that the ways in which influence operates are complex, how do I propose that an empirical analysis of musical expression can reveal the performance style of pedagogical tradition? Most string players plan their fingering and bowing in advance[65] and then practise for faultless execution. In the planning stage of fingering and or bowing, the perception of the phrasing of the music by the musician and his/her pedagogical tradition are always taken into account at the conscious or sub-conscious level. Given that portamento and vibrato in string playing are caused by a combination of aspects including fingering (how a performer shifts from one position to another) and phrasing with bowing, phrasing could be considered through an empirical analysis of expressive timing and dynamics in relation to phrase boundaries. An empirical analysis of musical expression in performance is one way of investigating how one performance style may derive from pedagogical tradition in addition to the means of expressivity (in relation to interpretation).

With the inclusion of multiple renditions by the same performers, Rose (1947; 1983), Starker (1954; 1959; 1994), Rostropovich (1957; 1983), Harrell (1980; 1997), Ma (1985; 1992) and Isserlis (1984; 2005), this study will also investigate how the styles of individual artists may remain / change and whether the so-called pedagogical styles may exist. In addition, in examining performances from French cellists including pre-1960s ones, Gendron (1952), Fournier (1955) and Tortelier (1978), I will also discuss whether similarities in styles could be discovered in a geographical tradition.

A quantitative analysis of musical expression considers in the twenty five selected recordings of the two Brahms cello sonatas to distinguish whether any kinds of common trends are detected, in particular whether pedagogical traditions can be discovered in the context of performance practice. Four different expressive parameters, expressive timing, dynamics (in relation to timing), vibrato and portamento (in the case of the F major cello sonata) are considered. By no means do the selected twenty five recordings represent a complete set of Brahms cello sonatas on record. However, with some earlier recordings (particularly by artists who made multiple renditions in the 1950s to 1970s) now unavailable, this set of data provides a useful guideline to the context of performance practice, in addition to providing empirical validity.

[65] One exception is the cellist Yo-Yo Ma, who admits he approaches fingering and bowing spontaneously.

Before considering performance trends through a quantitative method, the pedagogical backgrounds of the selected cellists are introduced. General performance trends, including the proportional relation of duration between movements, also are examined. For an empirical analysis of expressive timing, the hypothesis on pedagogical influence is also tested by comparing expressive timing by artists in the same pedagogical groups and also by artists with no pedagogical links. A correlation of quantitative data of expressive timing is computed in two ways: inter-beat-interval (IBI) level data sets, and variants further calculated through the relative computation of statistical modelling equations for musical expression.

Expressive dynamics were considered in relation to expressive timing in the twelve selected commercial recordings of the two sonatas. The widths and speed of vibrato also were considered in order to examine whether any kinds of performance trends are revealed. Given that portamento is likely to occur more frequently in slow movements, comparative analysis was conducted on the first nineteen bars of the Adagio from Brahms' F major cello sonata. For the portamento analysis, I consider the relationship between slide speed and the inter-onset-intervals of the following note, the occurrence rate of portamento and between pitch leap, and the slide speed in six selected recordings out of the twelve.

- **Pedagogical background of the selected cellists for investigation**

Blurring of pedagogical boundaries in the twentieth century emerges not only from the fact that artists could have studied under several influential teachers, but also that artists claim that attending one-off master classes with a celebrity figure of the time was the most influential event of their performing career (Campbell 1988: 228). Before presenting an empirical result of the similarity in handling musical expression, the pedagogical relationships between the investigated cellists are identified. The selected recordings for the investigation have already been introduced in Chapter 3 (see Table 3.1). Pedagogical relationships between one cellist and another are illustrated in Figure 4.1.[66] A direct pedagogical relationship is indicated by a solid line with an arrow pointing to the pupil, and less direct pedagogical involvement, such as a mere attendance at master classes, is illustrated with a dotted line.

Although the tradition of cello schools might have become blurred by the early twentieth century, Julius Klengel (1859–1933) and Hugo Becker (1864–1941) were considered as the "twin peaks" of cello playing. Klengel and Becker shared "artistic tastes" (Campbell 1986: 116) and both had backgrounds at the Dresden school, stemming from Grützmacher. According to Campbell (1988: 72), despite sharing "artistic tastes" and a pedagogical background, Klengel's and Becker's approaches to teaching were poles apart; that is, Becker concentrated on the scientific aspect, having conducted research into anatomy and physiology, whereas Klengel preferred an empirical approach by taking importance to individual pupils needs and experiences (*Ibid*.). Although neither cellist's performances have been archived on record, owing to recording technology only largely being available from the era of their pupils, both lineage styles of cello playing can be investigated.

Another two cellists known for bestriding twentieth-century cello playing were Casals in the earlier half and Rostropovich in the second half; Chapters 5 and 6 deal in detail with the performance aesthetics and artistic innovation of the two cellists respectively. Both Casals and Rostropovich were also active as teachers and mentors to the younger generation and the current investigation aims to identify the pedagogical relationships with Casals and/or Rostropovich and their stylistic influence on the handling of musical expression.

Cellists

[66] The diagram also includes information on the selected cellists, briefly discussed in Chapters 5 and 6.

Julius Klengel's (1859-1933) students

The early-recorded cellist Emanuel Feuermann (1902-1942) studied with Klengel. Feuermann's performance was characterised as having a clean and substantial technique and big tone, suitable for sustained lyric passages and tangible sincerity of musicianship. As a teacher, Feuermann suggested that students should "listen to the composer's idea and thoughtfully aspire to embody it" (Ginsburg 1983: 236). Similar to his teacher Klengel, Feuermann also speaks against mechanical imitation in the teaching process, and encourages a creative individuality to be developed independently within the frame of music as the principal objective.

Another of Klengel's noticeable pupils was William Pleeth (1916-1999), who later became one of the most influential cello teachers in Britain in the 1960s and 70s. Owing to his role as an influential figure in Jacqueline du Pré's (1945-1987) cello playing and musical career, he is best known as du Pré's cello papa. However, Pleeth himself also was a promising soloist himself, especially in his duo performances with his pianist wife Margaret Good. Pleeth considered himself a "more personal player than Klengel" (Campbell 1988: 179). His rendition provides a useful source for comparing the different styles in the teacher-student relationship.

Hugo Becker's (1864-1941) pupils

Due to Becker's perfectionism (or sarcasm), pupils did not last long under his direction (p.74). British cellist Beatrice Harrison (1892-1965) and Italian cellist Enrico Mainardi (1897-1976) appear to be the only cellists available on record who can be considered as Becker's pupils. Harrison may have been the legendary cellist of her times, but she was not particularly interested in passing her knowledge to the next generation, with the result that there is no notable student of Harrison in twentieth-century cello performance history (p.135). Mainardi was well known as a performer in Germany, Italy, Switzerland and Scandinavia, but was better known as a teacher in England and France. He stated that the study period with Becker enabled him to "analyse and cure technical problems" much more effectively for both himself and his students (p.127).

Piatigorsky: Klengel and Becker

In spite of having studied with both twin peaks, Klengel and Becker, Gregor Piatigorsky (1903-1976) spoke highly of neither of them; it is believed that he was marginally happier with Klengel (p.107). Piatigorsky's playing could provide alternative examples of a combined version of the Klengel and Becker lineage. His performing style is summarised as virile, logical and intelligent with grand interpretation, a virtuoso mastery and an expressive tone. The image of the music becomes neutralised in his renditions. Not only was Piatigorsky a great cellist in his own right, but he was also an influential teacher for many cellists, including Mischa Maisky (1948-), the English-born Raphael Wallfisch (1953-)[67] and Steven Isserlis (1958-) and Danish cellist Erling Blőndal Bengtasson (1932-), who not only studied with Piatigorsky but also worked as his teaching assistant. Piatigorsky, however, was opposed to the "pedantic or scholastic" (Ginsburg 1983: 258) and he comments that "you cannot learn how to learn, you must learn how to *feel*" (*Ibid.*).

Casals

A detailed account of Pablo Casals's (1876-1973) performing philosophy will be considered with reference to his performances on record in Chapter 5, but Casals was also an influential teacher and an inspiring colleague to his contemporaries, who will be studied at this point.

Gaspar Cassadó (1897-1966)[68] studied with Casals from the age of 10 and can be considered as the only available direct example of the Casals lineage. Cassadó enjoyed a thriving career in the 1920s to 30s, but due to the accusation of collaboration with the fascist government of Italy, an accusation led by none other than his own teacher, Casals, his reputation turned sour after the Second World War.

During his long successful career, Casals gave lessons and masterclasses to the younger generation. Both du Pré and Ma remark that attending Casals' masterclasses, and/or having lessons, were highly influential encounters in their performing careers. Casals as a conductor worked with younger cellists, such as Tortelier and Gendron, which would have provided some impact on their playing. Some musicians such as Rostropovich have an indirect connection with Casals, because although Rostropovich might not have been directly taught by Casals, Leopold Rostropovich (his father, who was also his first teacher), studied

[67] Wallfisch's rendition of Prokofiev's "unfinished" solo cello sonata is discussed in Chapter 6.
[68] Cassadó's performance is discussed in Chapter 5 in comparison with Casals' Bach.

with him. Some have no connection with Casals, but were nonetheless influenced by the cellist.

The Rose line

Leonard Rose (1918-1984) studied with the English cellist Felix Salmond at Curtis. Rose's style is respected for its profound and noble interpretation, virtuoso mastery and beautifully expressive tone. He believed in the importance of routine and regular practice and "psychological tuning" before the concert, such as having an imaginary audience and "planning" the performance, both in general and in minute detail.

Rose taught the American cellists Lynn Harrell (1944-) and Yo-Yo Ma (1955-). Rose's strict perfectionism once made Ma almost give up his musical career all together; although Ma only reconsidered his musical future having met Casals at a masterclasses, Ma later also spoke highly of Rose's schooling.

French cellists

In post-WW2 French cello playing, a number of crucial players including Fournier, Tortelier, Navarra and Gendron emerge; as discussed in Chapter 3, some of these players' renditions were considered as the so-called 'landmark' interpretations of the 1950s to 60s. An empirical analysis will examine how these players shape musical expression and whether there are similarities between the contemporaries themselves and also between their teachers or mentors (with whom they might not necessarily have a direct pedagogical link, but nonetheless claim to have been 'influential' figures in their musical career), in addition to their pupils and the younger generation.

Pierre Fournier (1906-86) is considered 'the aristocrat of cellists', not only for his lyrical playing but for his impeccable taste in all things artistic. Fournier and Paul Tortelier were friendly rivals, and once met after a recital given by Tortelier. Fournier said, 'Paul, I wish I had your left hand', to which Tortelier replied, 'Pierre, I wish I had your right.' (p.142). As a teacher, Fournier insisted upon a velvety and fluid tone, and a high right elbow. According to most of his former pupils, the essence of his teaching is difficult to pinpoint, because his teaching was individually-tailored.

Paul Tortelier (1914-1990) was a man of boundless energy and enthusiasm until the day of his death; his favourite quote was "the simpler we are, the more complete we shall be,

for simplicity signifies unity in truth" – Rodin (p.145)

Maurice Gendron (1920-1990) is considered to have been one of the most promising and elegant players in the post-war period. He was the only solo cellist to have been conducted by Casals on a commercial recording. In spite of the fact that there was no direct teaching involved between Gendron and Feuermann, Gendron claims that Feuermann was the crucial source of influence and inspiration for his playing, as well as for his teaching.

Russian and Eastern European cellists

As will be discussed in detail in Chapter 6, Mstislav Rostropovich's (1927- 2007) friendship and collaborations with composers such as Shostakovich, Prokofiev and Britten have made a huge contribution towards the twentieth-century cello repertoires. Rostropovich also was active as a teacher: his students included Maisky, who also studied with Piatigorsky, a Russian-born cellist, Alexander Ivashkin, (1948-)[69] and du Pré, who having made an early debut under Pleeth, then had lessons and/or attended several masterclasses by celebrities such as Casals, Tortelier, Gendron and Rostropovich. Alfia Bekova (1963-) also studied with du Pré, Rostropovich and Daniel Shafran.

Another Russian cellist was Daniil Shafran (1923-97), who in spite of never having been affiliated to a music college, was not only esteemed as a soloist but also in great demand as a teacher (p.189). From a review of his 1977 American tour: "His bowing is splendid, free and always under complete control, his style commendably devoid of mannerisms and he never allows his technical prowess to lead to a display of pure skill at the expense of his conception of the musical expression". Shafran's students include the British cellist Steven Isserlis (1958-), who also studied with Jane Cowan.

Hungarian-born Janos Starker (1924-) has had an outstanding performing career and still teaches the cello at Indiana University. His playing style is intense and involves great technical mastery. He quotes his long-time friend and colleague, Gyorgy Sebok, who said, "Create excitement. Don't get excited."

From Navarra

Having had no further tuition after the age of 15, André Navarra (1911-88) is considered as

[69] Ivashkin's two renditions of Prokofiev's "unfinished" solo cello sonata are discussed in Chapter 6

mainly “a self-taught musician” (Campbell 1988: 140). His playing was known as having a “romantic flavour and singing tone combined with technical mastery.” (p.141) He had an especially brilliant bowing technique and played with an endless legato in the slowest passages. His pupil, Heinrich Schiff, recalls that Navarra’s secret to bowing involved “allowing the right hand to fingers to listen”. The fingertips were the last link in the chain between body and sound, the refiners – “the last point before the control passes from the body into the instrument” (p.141). Anner Bylsma (1934-) and Heinrich Schiff (1951-) studied with André Navarra.[70] Bylsma is known more for playing a historically informed baroque style cello, whereas both Navarra and Schiff specialise in the modern instrument.

[70] Navarra’s tempo of Prokofiev’s op.119 is briefly discussed in Chapter 6.

4.2. General trends

- **Proportional relation of duration between movements**

In order to discover the pedagogical influence and period styles in performance trends, the proportional relation of duration between movements by each cellist is discussed.

Brahms' E minor sonata

Brahms' E minor sonata for cello and piano op.38 consists of three movements. The first movement is Allegro non troppo, 4/4 and is in sonata form; the following Allegretto quasi Menuetto is in A minor, 3/4 and in ternary form (ABA). The final movement, Allegro, returns to E minor, 4/4, and is a Fugue. Before moving on to detailed discussion of timing fluctuation in the second movement, the overall tempi of the work are considered. The tempo of each movement involves the term "Allegro", so the proportional tempi of op.38 can be expected to be similar to each other. The overall tempo of each movement was measured using the method described in section 2.2 of Chapter 2.

Let us initially consider the durational relation between movements. Duration between movements is computed relatively by reducing the given average of the duration of the three movements from the absolute level of duration data. Data indicate how the relation of duration between movements is shaped by each recorded artist.

Table 4.1. Proportional duration of movements relative to average duration in the E minor sonata

op.38	Date	1st mvt	2nd mvt	3rd mvt
Harrison / Moore	1927	1.84	-1.47	-0.36
Feuermann / van der Pas	1934	2.75	-1.99	-0.74
Piatigorsky / Rubinstein	1936	3.46	-2.67	-0.78
Gendron / Francaix	1952	3.2	-1.95	-1.13
Starker / Bogin	1954	5.01	-3.13	-1.88
Fournier / Backhaus	1955	2.6	-1.82	-0.77
Rostropovich / Richter	1957	4.38	-2.6	-1.76
Starker / Sebők	1959	5.06	-3.05	-2.01
du Pré / Barenboim	1968	4.13	-2.57	-1.54
Tortelier / de la Pau	1978	5.1	-2.87	-2.23
Harrell / Ashkenazy	1980	5.06	-3.1	-1.94
Shafran / Gottlieb	1980	2.57	-1.48	-1.09
Rose / Pommier	1983	5.81	-3.1	-2.71
Rostropovich / Serkin	1983	6.12	-3.55	-2.56
Isserlis / Evans	1984	3.16	-1.91	-1.23

Yo-Yo Ma / Ax	1985	5.64	-3.12	-2.42
Yo-Yo Ma / Ax	1992	3.56	2.15	-1.4
Starker / Buchbinder	1994	5.56	-3.4	-2.15
Bylsma /Orkis	1995	4.34	-2.45	-1.88
A Bekova / E Bekova	1996	6.08	-3.15	-2.92
Harrell / Kocacevich	1997	5.27	-3.09	-2.16
Schiff / Oppitz	1997	5.58	-3.26	-2.3
Maisky / Gililov	1999	5.74	-3.27	2.46
Bengtasson / Kavtaradze	1999	5.79	-3.42	-2.36
Isserlis / Hough	2005	5.18	-2.93	-2.24

In general, moderate variances between the duration of movements are found in performances recorded up to the 1960s (with the exception of Starker), whereas extreme differences are evident in performances recorded from the 1970s and upwards.

Extreme variances are seen as relatively long duration in the Allegro non troppo (1st movement) and relatively short ones in the Allegretto quasi Minuetto (2nd) and Allegro (3rd). It is noticeable that in spite of eliminating repeats in the Menuet, the relative duration of the second movement by Feuermann and Piatigorsky does not appear to be short.

F major sonata

Brahms' F major sonata for cello and piano op.99 consists of four movements. The F major first movement is Allegro vivace, 3/4 and is a sonata form, the following Adagio affettuoso is in F# major, 2/4 and a ternary form of ABA. The third movement is Allegro passionato, F minor, 6/8 and is another ternary form of ABA; the final movement is Allegro molto, F major, 2/2 and is Rondo. Before moving on to detailed discussion of timing fluctuation in the second movement, the overall tempo of the whole work and its proportion duration are considered.

Table 4.2. Proportional duration of movements relative to average duration in the F major sonata

op.99	Date	1st	2nd	3rd	4th
Casals / Horszowski	1936	2.13	0.48	0.28	-2.89
Pleeth / Good	1940	1.59	-0.44	0.58	-1.72
Rose / Owen	1947	1.73	-0.19	0.74	-2.25
Mainardi / Zecchi	1952	1.9	-0.08	0.02	-1.84
Fournier / Backhaus	1955	0.77	0.46	0.41	-1.62
Rostropovich / Richter	1957	1.81	0.86	-0.48	-2.19
Starker / Sebők	1959	2.3	0.27	0.13	-2.7

Piatigorsky / Rubinstein	1966	1.7	0.59	0.45	-2.73
du Pré / Barenboim	1968	1.68	0.38	0.47	-2.52
Tortelier / de la Pau	1978	1.97	-0.07	0.52	-2.4
Harrell / Ashkenazy	1980	1.71	0.37	0.94	-2.36
Shafran / Gottlieb	1980	2.37	0.18	0.12	-2.66
Rose / Pommier	1983	2.31	0.06	0.42	-2.78
Rostropovich / Serkin	1983	1.96	0.9	0.25	3.08
Isserlis / Evans	1984	1.81	0.54	-0.05	-2.28
Yo-Yo Ma / Ax	1985	2.18	0.41	0.16	-2.72
Yo-Yo Ma / Ax	1992	2.02	0.96	-0.13	-2.82
Starker / Buchbinder	1994	2.33	0.24	0.05	-2.59
Bylsma / Orkis	1995	1.9	-0.12	0.56	-2.34
A Bekova / E Bekova	1996	1.59	0.28	0.55	-2.42
Harrell / Kocacevich	1997	1.86	0.93	0.02	-2.81
Schiff / Oppitz	1997	2.11	0.16	0.51	-2.77
Maisky / Gililov	1999	1.89	-0.07	0.49	-2.29
Bengtasson / Kavtaradze	1999	2.56	-0.48	0.59	-2.66
Isserlis / Hough	2005	1.47	0.21	0.35	-2.01

In contrast to the case of the E minor sonata, of which trends were detected with reference to relatively extreme and moderate variances in relation to the date of recordings, the trend that was detected in the F major sonata was in relation to the durational structure of the music. With the exception of Rostropovich / Serkin in 1983, all of the performers (including Rostropovich / Richter in 1957) in the sample recordings mark the Allegro molto (4th movement) relatively short. The Allegro vivace (1st movement) is of a relatively long duration in general, whereas no particular trend is detected in the Adagio affettuoso (2nd) and Allegro passionato (3rd) movements.

To sum up, the performance trends of the E minor relative duration are related to historical aspects such as the date of recording, whereas the relative duration of the F major is related to the structure of the music.

- **Performance trends in the second movement of the E minor sonata**

Allegretto quasi Menuetto is in A minor and a ternary form of ABA. Unlike the Adagio Affettuoso of the op.99 sonata in F major, where semitone relationships of pitches dominate the character of the movement, a masterful combination of whole tone and semitone provides the essence of melodic ideas of this movement.

Overall, the A minor is modulated to the C minor in bar 30, which returns to A minor in bar 46. The F# minor Trio is modulated to the A major in bar 90, which responds to the F#

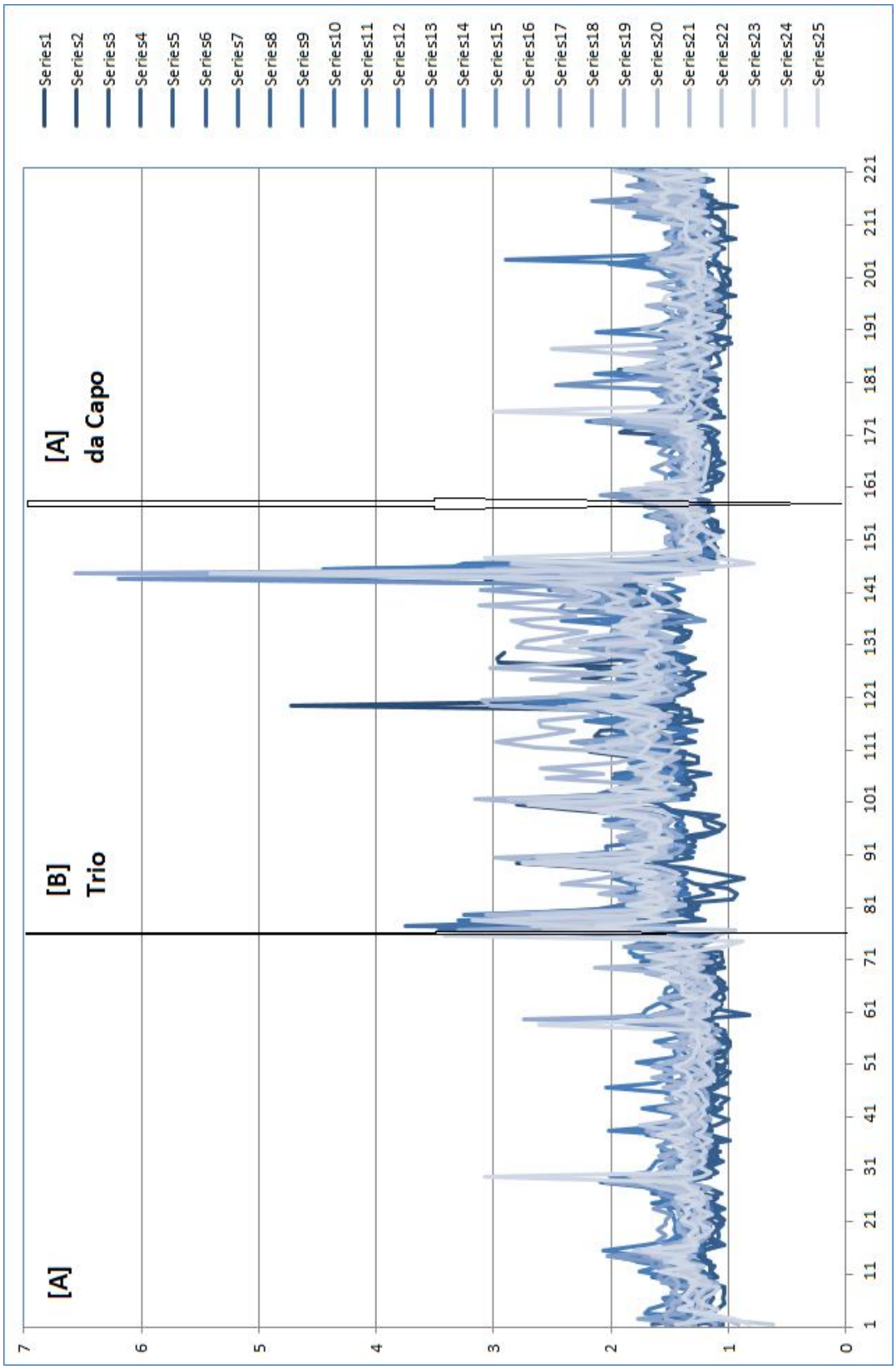
minor in bar 100. The returning A minor in bar 113 prepares for the da Capo, which becomes the third part of the ternary formal structure. Table 4.3 shows the grouping, phrase structure.

Table 4.3. Phrase structure of the Allegretto quasi Menuetto, Brahms Op.38

		Phrase	Grouping	Boundary	Cadence
A	*a*	bars 1-14	1+4+3+6	a: V-I	AC
		bars 15-28	1+4+3+6	a: V-I	AC
		bars 29-37	1+4+4	c: I-V	HC
	a'	bars 38-58	5+3+4+4+5	a: IV/V-V	HC
	a	bars 59-76	1+4+5+5+3	a: V-I	AC
B	*b*	bars 77-89	2+4+5+2	f#: V-I	AC
		bars 90-108	4+6+4+5	f#: V-I	AC
		bars 109-115	2+5	f#: I - a: V	HC
A	*a*	bars 1-14	1+4+3+6	a: V-I	AC
		bars 15-28	1+4+3+6	a: V-I	AC
		bars 29-37	1+4+4	c: I-V	HC
	a'	bars 38-58	5+3+4+4+5	a: IV/V-V	HC
	a	bars 59-76	1+4+5+5+3	a: V-I	AC

Phrase boundaries in Part A, both in the opening and da Capo, are consistently slowed down. That is, the general tendency of practice does not differ much, whether boundaries are marked with an extended authentic (V-I) cadence in bars 14 and 28, a C minor half cadence (I-V), which prepares for the change in mood, an A minor half cadence (IV/V-V) of the phrase *a'* in bar 58 or another authentic cadence (V-I) in the closing. In the Trio, an authentic cadence (V-I) in bar 89 and a half cadence in bar 115 are slowed down, but an authentic cadence (V-I) in bar 108 is not marked with a gradual ritardando in the repeat.

Figure 4.1. Bar level Timing fluctuation of the selected performance: the Allegretto quasi Menuetto, Brahms Op.38



Section A

The cello's melodic idea in bars 1-14 is characterised mostly by a whole tone relation of A-C-D-E. The motive in bars 1-5 appears repetitively throughout the movement, which provides an overall sense of complexity. The first part, A, consists of five phrases: the piano suggests a foregoing motive, consisting of the E and its neighbouring pitches, which responds to the cello's melody with a sense of affliction, accompanied by arpeggioed chords of the piano. Bars 7-8 are highlighted by the highest pitch G5, with harmonic progression of leading tone to dominant (vii-V), which creates a tension in a grouping structure of 1+4+3+6. Here, bars 9-14 act as a bridge passage of an extended authentic (V-I) cadence. As the piano takes over the same melodic idea to the first phrase, the two instruments swap the roles of melody and accompaniment in bar 15.

A sense of phrasing direction is almost lost in the opening due to the frequent occurrence of Harrison's over-dotted rhythms and the following staccato quavers becoming rushed. Moore's playing of the same melody in bars 15-24 is identified by evenness; the Harrison/Moore duo seems to emphasise their individual playing styles more than building an identical blended rhythmic playing style together. Whilst over-dotted rhythms do not occur in Feuermann, quavers are rushed throughout bars 1-28. He then places rubato in every down beat in bars 16-20, which sounds somewhat odd, considering that the cello's role there is to accompany the piano melody.

Bouncy rubato on down beats and effervescent staccatos on the following quavers are characterised by Piatigorsky's dotted rhythm throughout bars 1-28. Similar shaping is found in Rostropovich, Harrell and Maisky. Ma also places rubato on down beats, but his rubato is perceived as cautious rather than bouncy. In contrast to the Harrison/Moore duo, the du Pré/Barenboim duo's rhythmic style is perceived as an ensemble. That is, du Pré stresses every down beat in bars 2-8, including dotted rhythm with rubato, while Barenboim matches his rhythmic execution to his cellist's style, by placing subtle rubato on every downbeat in bars 16-22.

Rather than marking every occurrence of authentic cadences in bars 14 and 28, Piatigorsky highlights the cadence in bars 27-28 by placing ritardando, which can be assumed as his first phrase boundary. With regard to the extended ritardando in bars 25-28, du Pré would also have seen a bigger phrase of bars 1-28, like Piatigorsky. The Rostropovich, Ma, Harrell and Maisky duos place ritardando on both authentic cadences in bars 14 and 28. Whilst Ma's and Harrell's ritardandi are subtle on both occasions, Rostropovich and Maisky exaggerate the ritardando in bar 28.

The main pitches of the C minor melodic idea in bars 29-45 are G-F-Eb-A, characterised by a mostly whole tone relation. The developed melody in C minor is played by the cello in bar 29 in a grouping structure of 1+4+4, which is resolved by a half cadence (I-V) in bars 36-37, which has already been introduced in bars 34-35. Cadence here also prepares for the change of mood. Whilst still in C minor, chromatic descending scales in bars 39 and 43 on the cello and in bar 41 on the right hand of the piano mark a relatively tender melody and the piano and cello play in canon up to bar 45. Harmony progresses to tonic-subdominant in bars 42-45, providing a sense of plagal half cadence. From bar 46, the piano takes over the C minor melody, which gradually modulates back to A minor with crescendo. The fourth phrase, which begins in bar 38, is in a grouping structure of 5+3+4+4+5 and is resolved in another half cadence (IV/V-V) in bar 58. The opening melodic idea returns to the cello in bar 59; the piano accompaniment, however, is in chords rather than arpeggios. The first part ends with the cello's pizzicato and piano's staccato in authentic cadence (V-I) in a grouping structure of 1+4+5+5+3.

Bars 30-37

In the occurrence of the same melodic pattern in C minor in bar 30, rhythmic styles remain identical to the opening, such as Harrison's over-dotted rhythm and a group of hurried quavers, Feuermann's rushed quavers, Piatigorsky's and Rostropovich's bouncing quality, and du Pré's and Ma's rubato on every downbeat.

A sense of phrasing direction, however, is not totally lost in Harrison, since followed by rubato in bars 34-35, and a half cadence (I-V) is marked with ritardando in bars 36-37 in playing the developed melody in C minor in a grouping structure of 1+4+4. Feuermann places slow rubato on G5 in bars 35 and 37, which appears his way of making the C minor half cadence magical. Piatigorsky, du Pré, Ma and Harrell also mark the C minor half cadence by applying rubato on the G5 in bars 35 and 37. Maisky applies rubato on the pitch E in bars 34 and 36 in addition to the following G5. Rostropovich does not mark any expressive gesture in bars 35-37.

Bars 38-58

The initial pitches of the C minor descending chromatic scales, the G5 and C6 in bars 39 and 42, and the following trills, the Eb5 and A5 in bars 40 and 43, are highlighted with rubato in Piatigorsky's rendition. However, when the right hand of the piano takes over the same melody, Rubinstein plays the chromatic scales with a flowing gesture rather than highlighting

any particular pitches. du Pré also enjoys trills in bars 40 and 43 and Barenboim matches her rubato styles, with trills occurring on the right hand in bars 42 and 46.

Bars 59-76

In the return of the opening material, individual rhythmic styles remain, such as Harrison's over-dotted rhythm and a group of hurried quavers, Feuermann's rushed quavers, Piatigorsky's and Rostropovich's bouncing quality, and du Pré's and Ma's rubato on every downbeat. Piatigorsky, du Pré, Ma and Maisky place rubato on the A5 in bar 70, whilst a lower octave is not highlighted in any manner. An authentic cadence of Part A is not highlighted with much gradual slowing down, presumably due to the light texture caused by pizzicati accompanied by the staccato of the piano.

Section B, Trio

The second part, B, is a Trio and opens in F# minor. Melodic progression in the Trio is largely engaged with the use of chromatic scales. The piano plays the developed melodic idea in unison with the cello in a grouping structure of 2+4+5+2, which is resolved in an authentic cadence (V-I). The second phrase of B is in the relative key of A major, in a grouping structure of 4+6, which closes in a half cadence (VI-V) in bars 97-99.

Owing to the repeat structure of the Trio, the listener is usually given another chance to enjoy these magical moments. However, in both Feuermann's and Piatigorsky's renditions, the artists choose not to repeat this section. When its expressive temporal gestures are heard only once, it somehow makes the listener appreciate their handling of expressiveness as sometimes even more special.

Bars 77-89

The main pitches of the Trio, C (B#) – C# – B, are more clearly indicated in the second phrase (bars 90-99) than the first one (bars 77-89). Chromatic scales of descending – ascending – descending in the first three bars of the first and second phrases in the Trio are identical (i.e. bars 79-81 and bars 90-92) to one another. Harmonic progressions, however, differ as tonic-dominant of F# minor in bars 79-81 and tonic-leading tone of A major I-vii in bars 90-92. Pitch intervals in the following five bars (i.e. bars 82-86 and bars 93-97) are also identical, although the beginning pitch differs from the E#3 in bar 82 and G#3 in bar 93. How tempo rendition is different in interpretation will be suggested later.

In other words, by keeping pitch intervals identical, Brahms achieves a sense of compound between the two phrases, and by applying different pitches, he avoids boredom, which could have occurred by mere repetition.

In the Trio, the downbeat in bar 79, one of the main pitches of the Trio C5 (B#4) is highlighted with rubato by the Harrison/Moore duo. Harrison then places rubato on the highest pitches of phrases such as E5 in bar 80, and G5 in bars 82-84. Almost identical shaping of rubato to that of Harrison is discovered in Feuermann's Trio. That is, followed by the placing of rubato on the C5 (B#4) in bar 79, his rubato is found on the highest pitches of phrases such as E5 in bar 80 and G5 in bars 82-84. Unlike his contemporaries Harrison and Feuermann, Piatigorsky does not highlight the opening of the Trio with any rubato.

du Pré applies rubato on the highest pitch of the phrase, such as G5 in bar 82, which acts as the beginning of crescendo and ritardando throughout bars 82-84. Although ritardando or rubato on any specific pitches are not applied, bars 82-84 are also enjoyed with a delicately slower tempo and a serene and flowing mood by Rostropovich and Ma. Temporal expressions are not used in executing bars 82-84 by Harrell and Maisky.

The F# minor authentic cadence (V-I) in bar 88 and the A major half cadence (VI-V) represent the good balance and co-ordination of the Harrison/Moore duo. Ritardandi in an authentic cadence in bar 88 are found, although the scale of ritardandi varies between large (Feuermann) and delicate (Piatigorsky, du Pré Rostropovich, Ma, Harrell and Maisky).

Bars 90-108

The cello takes over the melodic line in bar 100 and the two instruments no longer play melody in unison. The key returns to F# minor in a grouping structure of 4+5, which is resolved in an authentic cadence (V-I) in bar 108. A bridge passage between parts 2 and 3, bars 109-115, begins in F# minor, but soon returns to A minor to prepare for the recapitulative part, A. The Trio closes in a half cadence, and da Capo indicates a return to the opening, which becomes the third part of the formal structure.

du Pré applies rubato on the highest pitch of the phrase, such as B5 in bar 93, which acts as the beginning of crescendo and ritardando throughout bars 93-95. Bars 93-95 are also characterised by a delicately slower tempo and a serene and flowing mood by Rostropovich, Ma and Harrell. Maisky's shaping is unique, as his delicate ritardando in bars 93-95 is accompanied by diminuendo. Delicate ritardandi in A major half cadence (VI-V) in bars 97-99 are found in the Harrison, Feuermann, Piatigorsky, du Pré Rostropovich, Ma, Harrell and Maisky renditions.

In the Harrison/Moore duo's rendition, the forwarding direction is indicated by rushed rhythmic playing throughout bars 100-104, where the cello takes over the melodic line in bar 100 and the two instruments no longer play melody in unison. Piatigorsky also applies a subtle rush throughout bars 100-104, which indicates a sense of forwarding direction. Followed by rushed rhythmic playing throughout bars 100-104, Feuermann places rubato on the D5, E5 in bar 105, G5 in bar 106 and A4 in bar 107 in a grouping of four quavers, whilst the general phrasing direction becomes forward moving. Ma's shaping of rubato in a grouping of four quavers in bars 101-103 and bars 105-107 is similar to Feuermann's, du Pré's and Rostropovich's gradual expansion of ritardandi and crescendi (ritardandi and diminuendi in Maisky's case). See the climaxes on the highest pitch of the phrase, such as A5 in bars 103 and 107.

The extent of tempo variation at both absolute (literal level) and relative (in relation to all the investigated performances) measures is wide in the overall structure of the movement. For the absolute modulation in the movement, the standard deviation and the average of the tempo data of the twelve performances correlate positively ($r = 0.6$, $p = 0.03$). For the relative modulation in the movement, I calculate the standard deviation divided by the mean and the average of the tempo data of the twelve performances, which indicates a positive correlation ($r = 0.47$, $p = 0.00001$).

The extent of tempo variation becomes varied when calculated by sections. For instance, modulation depths in section A are delicate at both absolute ($r = 0.14$, 0.17, $p = 0.00006$, 0.00005, the opening and da Capo respectively) and relative ($r = -0.04$, -0.05, $p = 0.00008$, 0.00008) measures, which indicates little modification throughout. However, modulation depths in section B of the Trio are large at both absolute ($r = 0.61$, $p = 0.03$) and relative ($r = 0.35$, $p = 0.00002$) measures.

- **Performance trends in the second movement of the F major sonata**

The Adagio affettuoso is in F# major and a ternary form of ABA'. Margaret Notley (1994) regards the movement to be a ternary form, i.e. certainly not a sonata form movement, and she devises the form of the movement into ABA'+coda, whereas Elaine Sisman (1990) views it as ABA, or a sonata form. Nevertheless, although the final recapitulation-like section may involve borrowed material from section B, I view the final section as the A', which is a modified format of section A and therefore I consider the movement as a ternary form of ABA', without the coda.

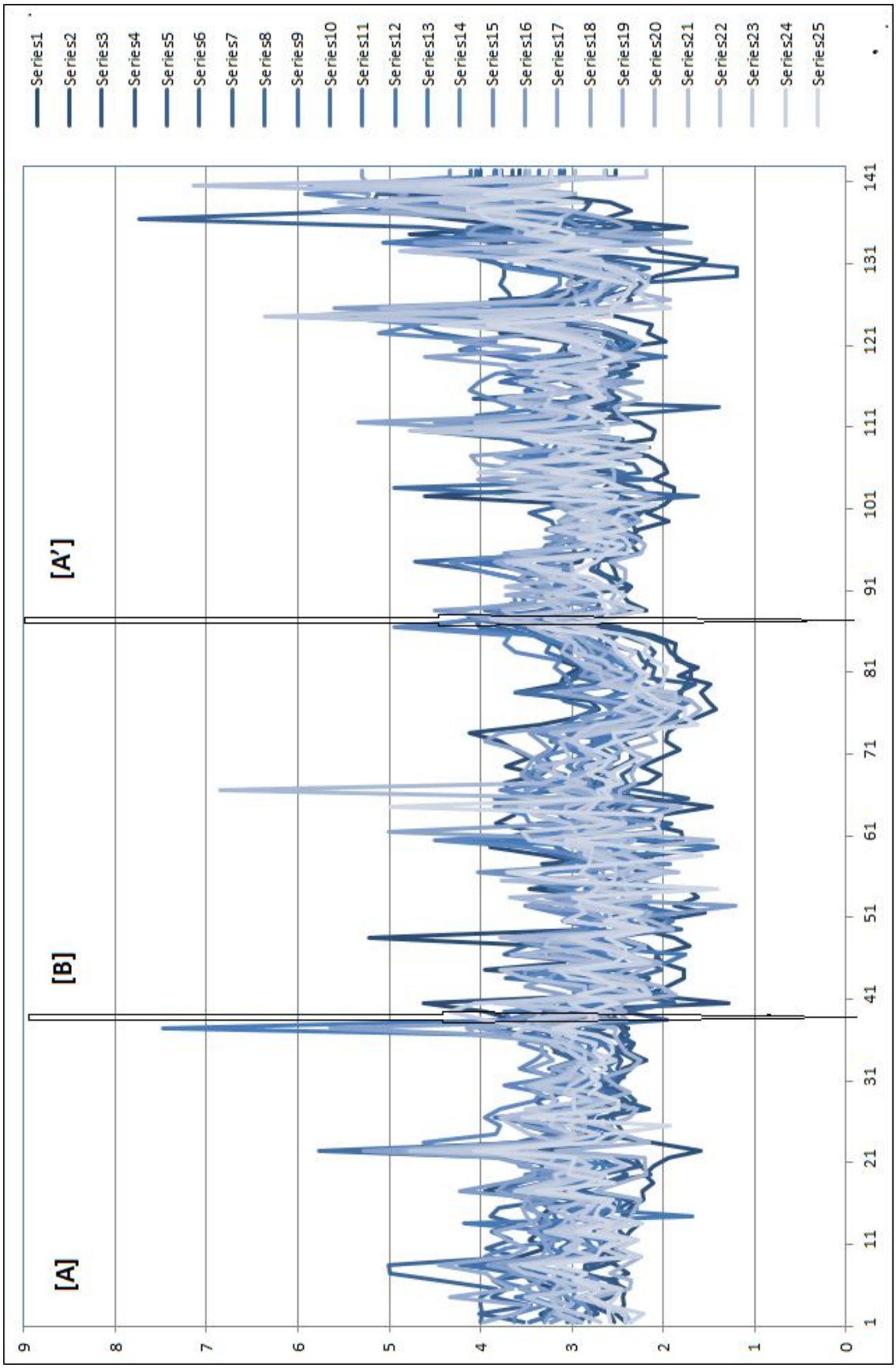
Table 4.4. Phrase structure of the Adagio affettuoso, Brahms op.99

	Phrase	Grouping	Key	Boundary	Cadence
A	bars 1-11	4+4+3	F# major	I-V	HC
	bars 12-19	4+4	F# major	I-V	HC
B	bars 20-32	5+4+4	Db major	I-IV	PHC
	bars 33-43	4+3+4	Gb major	ii-V	HC
A'	bars 44-55	4+4+4	F# major	I-V	HC
	bars 56-62	4+3	F# major	vii-V	HC
	bars 63-71	3+5	F# major	V-I	AC

Brahms' weighting towards a melodic semitonal relation rather than a Neapolitan relationship between F minor to F# major appears ambiguous from a theoretical music point of view, including that of Notely (p.141). She finds "semitonal relationships" and associated "wayward resolutions" (p.146) were used as a central and expressive purpose to the form; I consider that Brahms' attitudes towards melodic relation, however, can be assumed as his consideration towards the vocal quality of the cello. Overall, the F# major is modulated to the C# major in bar 16, which is followed by the F minor in bar 20 and is modulated into the Db major in bar 30, followed by the Gb major in bar 40. The recapitulation-like section opens with the F# major, followed by a short shift to D major in bars 51-53, where the key returns to the F# major. Let us now consider the phrase structure of the Adagio affettuoso. Table 4.9 illustrates the grouping structure, phrase boundaries and cadences.

Overall, phrase boundaries are shaped by a gradual slowing down; for instance, the F# major half cadences in bars 11, 19 and 55. All the investigated cellists slow down in the boundaries of the F minor authentic cadence in bar 28, the Gb major half cadence in bar 43 and the final authentic cadence in F# major.

Figure 4.2. Beat level Timing fluctuation of the selected performance: the Adagio affettuoso, Brahms op.99



Section A

The V^7/IV in bar 2 and the cello's E# clash with the E of the piano appears "surprising" to Notley and she considers that the V^7/VII in bar 6 parallels the V^7/IV in bar 2. However, whilst bar 2 is not highlighted with rubato, the A4 in bar 6 (of the cello part) is also marked with lengthy rubato by Casals, Piatigorsky and Rostropovich, which suggests an example of the contrasting perception of a score between a score analyst and performers. All the investigated duos begin to slow down from the third beat of bar 4 on the C# chord. A chromatic accent V^7/I in bar 8 is highlighted with slowing down by all the investigated cellists, in which steady rubato extends to the first beat of bar 9. All the investigated duos also highlight the D5 in bar 9 (of the cello part) with lengthy rubato, which is the beginning of a sub-phrase. Casals and Piatigorsky slow down on the final note of bar 9; du Pré and Rostropovich place rubato on the second beat of bar 13 on the G#-C# chords. Throughout section A (in bars 1-19), the melodic notes F#-E#-E semitone figure dominates.

Section B

The Casals duo builds some expressive moments by the casting of rubato. For instance, they slow down on the second beat of bar 20 on the dominant of F minor and the first beat of bar 24 on the tonic of the F minor. The Yo-Yo Ma duo's contrasting executions in bars 20-24 and 24-28 appear noticeable: Brahms' organisation of the F# major and F minor bass-line is paralleled in the selected excepts and other duos' timing fluctuations are similar in shaping, even though bars 24-28 might have been less emphasised. The Ma duo, on the other hand, takes a seemingly unusual contrasting approach between the two by taking a faster tempo in bars 25-66. The syncopation rhythm in bar 30 is emphasised with rubato by Piatigorsky, Rostropovich and Maisky. The prolonged Db7 in bar 39, which can be considered as a Gb major triad (on the second beat), is also emphasised by slowing down by the Casals and Piatigorsky duos and is faster than the Harrell duo.

Section A'

As with bars 8-9, another chromatic accent V^7/I in bar 51 is highlighted with slowing down by all the investigated cellists, while rubato extends to the first beat of bar 52. The Ma duo appears to place rubato on more unusual places than any of the other duos. That is, rubato is often found in the beat following that of the places of any other duo. For instance, the phrase boundary in bar 55, F# major half cadence, is slowed down by most duos, with the exception of that of Ma, where rubato emphasis is placed on the following D major chord in bar 56.

The second beat of bar 62, the C# chord, is emphasised with another slowing down by most of the investigated duos: exceptionally, the Ma duo highlights the following C# chord in bar 63 with slowing down.

Whilst phrasing and interpretation in Casals' rendition overall were debatable points amongst music critics, my overall tempo analysis suggests that Casals' phrasing with regard to tempo fluctuation in section A has similar shaping to the other renditions. After all, sceptical Anderson (1979) also appreciates the cellist's total control of the slow movement. In addition, A.R.'s 1940 remark about Casals-Horszowski, "the beauty of [Casals'] tone and phrasing, the deep feeling of the slow movement", can be seen as a very personal and emotional perception of the rendition. Indeed, Casals' tempo fluctuation appears slower than the other performances and he places longer pauses than other cellists in the phrase boundaries of section B.

The extent of tempo variation suggests that delicate application of variation can be seen in the relative depth, which indicates very few changes in modulations in relation to all the investigated performances, whereas the absolute measure of the timing modulation is large. For the absolute modulation, the standard deviation and the average of the tempo data of the twelve performances correlate positively ($r = 0.72$, $p = 0.007$). I shall soon move on to the IOI level timing data interpretation and attempt to discover whether a similar finding can be obtained. For the relative modulation, I calculate the standard deviation divided by the mean and the average of tempo data of the twelve performances, which indicates negative correlation ($r = 0.16$, $p = 0.005$).

The extent of tempo variation becomes varied when calculated by sections. For instance, modulation depths in section A are large at both absolute ($r = 0.56$, $p = 0.05$) and relative ($r = 0.28$, $p = 0.0003$) measures, which indicate noticeable modifications throughout. However, modulation depths in section B are large at absolute ($r = 0.3$, $p = 0.03$) but delicate at relative ($r = -0.04$, $p = 0.008$) measures. The following modulation depths in section A are large at both absolute ($r = 0.62$, $p = 0.002$) and relative ($r = 0.28$, $p = 0.0003$) measures, which also indicates noticeable modifications throughout.

4.3. Expressive timing on record

The case of pedagogical influence is investigated through the correlation rates of expressive timing by artists in the same pedagogical groups, as well as by artists with no pedagogical links, through the absolute level of inter-beat-interval (IBI) data sets, and also through the relative level of variants, which is further calculated through the modelling equation of musical expression.

- **The second movement of the E minor sonata**

In the case of a correlation analysis of expressive timing at IBI level data of the second movement of the E minor Cello Sonata, findings suggest a fair similarity (r = 0.4~0.8, p < 0.001). They suggest this when the two performances are selected by whatever criteria of pedagogical background, which suggests that there is no influence.

By further calculation through the modelling equation, the intention is to discover whether specific individual styles exist in each performer in the mathematical term and whether mathematical analysis might find certain similarities between the two chosen performances.

Table 4.5. Relative level of expressive timing data: E minor

x ; y	*N*	*r*	*p*
Harrison / Moore ; Feuermann / van der Pas	221	0.0552	0.448
Harrison / Moore ; Piatigorsky / Rubinstein	221	0.0387	0.0015
Harrison / Moore ; Gendron / Francaix	221	0.1241	0.065
Harrison / Moore ; Starker / Bogin	221	0.2059	0.002
Harrison / Moore ; Fournier / Backhaus	221	0.1885	0.005
Harrison / Moore ; Rostropovich / Richter	221	0.3002	< 0.001
Harrison / Moore ; Starker / Sebők	221	0.1509	0.025
Harrison / Moore ; du Pré / Barenboim	221	0.4492	< 0.001
Harrison / Moore ; Tortelier / de la Pau	221	0.1331	0.048
Harrison / Moore ; Harrell / Ashkenazy	221	0.3893	< 0.001
Harrison / Moore ; Shafran / Gottlieb	221	0.0697	0.302
Harrison / Moore ; Rose / Pommier	221	0.0647	0.338
Harrison / Moore ; Rostropovich / Serkin	221	0.2118	0.002
Harrison / Moore ; Isserlis / Evans	221	0.253	< 0.001
Harrison / Moore ; Yo-Yo Ma / Ax 1985	221	0.2591	< 0.001
Harrison / Moore ; Yo-Yo Ma / Ax 1992	221	0.2754	< 0.001
Harrison / Moore ; Starker / Buchbinder	221	0.3489	< 0.001
Harrison / Moore ; Bylsma / Orkis	221	0.3458	< 0.001
Harrison / Moore ; A Bekova / E Bekova	221	0.0867	0.199
Harrison / Moore ; Harrell / Kocacevich	221	0.2775	< 0.001

Harrison / Moore ; Schiff / Oppitz	221	0.2265	< 0.001
Harrison / Moore ; Maisky / Gililov	221	-0.0913	0.176
Harrison / Moore ; Bengtasson / Kavtaradze	221	0.1616	0.016
Harrison / Moore ; Isserlis / Hough	221	-0.0722	0.285
Feuermann / van der Pas ; Piatigorsky / Rubinstein	221	0.2342	0.001
Feuermann / van der Pas ; Gendron / Francaix	221	-0.0025	0.973
Feuermann / van der Pas ; Starker / Bogin	221	0.1327	0.067
Feuermann / van der Pas ; Fournier / Backhaus	221	0.0505	0.488
Feuermann / van der Pas ; Rostropovich / Richter	221	0.1422	0.05
Feuermann / van der Pas ; Starker / Sebők	221	0.2085	0.004
Feuermann / van der Pas ; du Pré / Barenboim	221	0.1673	0.021
Feuermann / van der Pas ; Tortelier / de la Pau	221	-0.0601	0.408
Feuermann / van der Pas ; Harrell / Ashkenazy	221	0.095	0.191
Feuermann / van der Pas ; Shafran / Gottlieb	221	0.0463	0.525
Feuermann / van der Pas ; Rose / Pommier	221	-0.0106	0.884
Feuermann / van der Pas ; Rostropovich / Serkin	221	0.2461	< 0.001
Feuermann / van der Pas ; Isserlis / Evans	221	0.0251	0.731
Feuermann / van der Pas ; Yo-Yo Ma / Ax 1985	221	0.3104	< 0.001
Feuermann / van der Pas ; Yo-Yo Ma / Ax 1992	221	0.034	0.64
Feuermann / van der Pas ; Starker / Buchbinder	221	0.105	0.148
Feuermann / van der Pas ; Bylsma / Orkis	221	0.3303	< 0.001
Feuermann / van der Pas ; A Bekova / E Bekova	221	0.1722	0.017
Feuermann / van der Pas ; Harrell / Kocacevich	221	0.2272	0.002
Feuermann / van der Pas ; Schiff / Oppitz	221	0.2883	< 0.001
Feuermann / van der Pas ; Maisky / Gililov	221	0.0986	0.175
Feuermann / van der Pas ; Bengtasson / Kavtaradze	221	0.0603	0.408
Feuermann / van der Pas ; Isserlis / Hough	221	0.1234	0.089
Piatigorsky / Rubinstein ; Gendron / Francaix	221	0.1115	0.125
Piatigorsky / Rubinstein ; Starker / Bogin	221	0.2053	0.004
Piatigorsky / Rubinstein ; Fournier / Backhaus	221	0.2558	< 0.001
Piatigorsky / Rubinstein ; Rostropovich / Richter	221	0.2572	< 0.001
Piatigorsky / Rubinstein ; Starker / Sebők	221	0.1859	0.01
Piatigorsky / Rubinstein ; du Pré / Barenboim	221	0.3668	< 0.001
Piatigorsky / Rubinstein ; Tortelier / de la Pau	221	0.1586	0.028
Piatigorsky / Rubinstein ; Harrell / Ashkenazy	221	0.1271	0.08
Piatigorsky / Rubinstein ; Shafran / Gottlieb	221	0.0809	0.266
Piatigorsky / Rubinstein ; Rose / Pommier	221	0.1456	0.044
Piatigorsky / Rubinstein ; Rostropovich / Serkin	221	0.2079	0.004
Piatigorsky / Rubinstein ; Isserlis / Evans	221	0.2511	< 0.001
Piatigorsky / Rubinstein ; Yo-Yo Ma / Ax 1985	221	0.3438	< 0.001
Piatigorsky / Rubinstein ; Yo-Yo Ma / Ax 1992	221	0.1472	0.042
Piatigorsky / Rubinstein ; Starker / Buchbinder	221	0.1026	0.158
Piatigorsky / Rubinstein ; Bylsma / Orkis	221	0.3236	< 0.001
Piatigorsky / Rubinstein ; A Bekova / E Bekova	221	0.2296	0.001
Piatigorsky / Rubinstein ; Harrell / Kocacevich	221	0.4486	< 0.001
Piatigorsky / Rubinstein ; Schiff / Oppitz	221	0.3241	< 0.001

Piatigorsky / Rubinstein ; Maisky / Gililov	221	0.124	0.087
Piatigorsky / Rubinstein ; Bengtasson / Kavtaradze	221	-0.1659	0.022
Piatigorsky / Rubinstein ; Isserlis / Hough	221	0.0797	0.273
Gendron / Francaix ; Starker / Bogin	221	0.431	< 0.001
Gendron / Francaix ; Fournier / Backhaus	221	0.5405	< 0.001
Gendron / Francaix ; Rostropovich / Richter	221	0.5173	< 0.001
Gendron / Francaix ; Starker / Sebők	221	0.1845	0.006
Gendron / Francaix ; du Pré / Barenboim	221	0.1488	0.027
Gendron / Francaix ; Tortelier / de la Pau	221	0.5695	< 0.001
Gendron / Francaix ; Harrell / Ashkenazy	221	0.4991	< 0.001
Gendron / Francaix ; Shafran / Gottlieb	221	0.414	< 0.001
Gendron / Francaix ; Rose / Pommier	221	0.5493	< 0.001
Gendron / Francaix ; Rostropovich / Serkin	221	-0.0658	0.33
Gendron / Francaix ; Isserlis / Evans	221	0.4708	< 0.001
Gendron / Francaix ; Yo-Yo Ma / Ax 1985	221	0.0084	0.901
Gendron / Francaix ; Yo-Yo Ma / Ax 1992	221	0.5727	< 0.001
Gendron / Francaix ; Starker / Buchbinder	221	0.4214	< 0.001
Gendron / Francaix ; Bylsma / Orkis	221	-0.1277	< 0.001
Gendron / Francaix ; A Bekova / E Bekova	221	0.4106	< 0.001
Gendron / Francaix ; Harrell / Kocacevich	221	-0.0161	0.812
Gendron / Francaix ; Schiff / Oppitz	221	0.0833	0.217
Gendron / Francaix ; Maisky / Gililov	221	0.1853	0.006
Gendron / Francaix ; Bengtasson / Kavtaradze	221	0.0824	0.222
Gendron / Francaix ; Isserlis / Hough	221	-0.1673	0.013
Starker / Bogin ; Fournier / Backhaus	221	0.5581	< 0.001
Starker / Bogin ; Rostropovich / Richter	221	0.6835	< 0.001
Starker / Bogin ; Starker / Sebők	221	0.1755	0.009
Starker / Bogin ; du Pré / Barenboim	221	0.2614	< 0.001
Starker / Bogin ; Tortelier / de la Pau	221	0.5285	< 0.001
Starker / Bogin ; Harrell / Ashkenazy	221	0.5129	< 0.001
Starker / Bogin ; Shafran / Gottlieb	221	0.4758	< 0.001
Starker / Bogin ; Rose / Pommier	221	0.5246	< 0.001
Starker / Bogin ; Rostropovich / Serkin	221	-0.1822	0.007
Starker / Bogin ; Isserlis / Evans	221	0.4951	< 0.001
Starker / Bogin ; Yo-Yo Ma / Ax 1985	221	0.0253	0.708
Starker / Bogin ; Yo-Yo Ma / Ax 1992	221	0.5206	< 0.001
Starker / Bogin ; Starker / Buchbinder	221	0.4871	< 0.001
Starker / Bogin ; Bylsma / Orkis	221	-0.0923	0.171
Starker / Bogin ; A Bekova / E Bekova	221	0.2988	< 0.001
Starker / Bogin ; Harrell / Kocacevich	221	-0.1284	0.057
Starker / Bogin ; Schiff / Oppitz	221	0.0731	0.28
Starker / Bogin ; Maisky / Gililov	221	0.0636	0.347
Starker / Bogin ; Bengtasson / Kavtaradze	221	0.104	0.123
Starker / Bogin ; Isserlis / Hough	221	-0.2264	< 0.001
Fournier / Backhaus ; Rostropovich / Richter	221	0.6408	< 0.001
Fournier / Backhaus ; Starker / Sebők	221	0.2498	< 0.001

Fournier / Backhaus ; du Pré / Barenboim	221	0.2796	< 0.001
Fournier / Backhaus ; Tortelier / de la Pau	221	0.5992	< 0.001
Fournier / Backhaus ; Harrell / Ashkenazy	221	0.5371	< 0.001
Fournier / Backhaus ; Shafran / Gottlieb	221	0.4444	< 0.001
Fournier / Backhaus ; Rose / Pommier	221	0.7067	< 0.001
Fournier / Backhaus ; Rostropovich / Serkin	221	-0.0709	0.294
Fournier / Backhaus ; Isserlis / Evans	221	0.5179	< 0.001
Fournier / Backhaus ; Yo-Yo Ma / Ax 1985	221	0.077	0.254
Fournier / Backhaus ; Yo-Yo Ma / Ax 1992	221	0.5435	< 0.001
Fournier / Backhaus ; Starker / Buchbinder	221	0.4897	< 0.001
Fournier / Backhaus ; Bylsma / Orkis	221	-0.0363	0.591
Fournier / Backhaus ; A Bekova / E Bekova	221	0.461	< 0.001
Fournier / Backhaus ; Harrell / Kocacevich	221	-0.0426	0.528
Fournier / Backhaus ; Schiff / Oppitz	221	0.1646	0.014
Fournier / Backhaus ; Maisky / Gililov	221	0.2474	< 0.001
Fournier / Backhaus ; Bengtasson / Kavtaradze	221	0.1553	0.021
Fournier / Backhaus ; Isserlis / Hough	221	-0.1856	0.006
Rostropovich / Richter ; Starker / Sebők	221	0.273	< 0.001
Rostropovich / Richter ; du Pré / Barenboim	221	0.3141	< 0.001
Rostropovich / Richter ; Tortelier / de la Pau	221	0.5921	< 0.001
Rostropovich / Richter ; Harrell / Ashkenazy	221	0.761	< 0.001
Rostropovich / Richter ; Shafran / Gottlieb	221	0.5535	< 0.001
Rostropovich / Richter ; Rose / Pommier	221	0.5702	< 0.001
Rostropovich / Richter ; Rostropovich / Serkin	221	-0.0929	0.169
Rostropovich / Richter ; Isserlis / Evans	221	0.7465	< 0.001
Rostropovich / Richter ; Yo-Yo Ma / Ax 1985	221	-0.0365	0.589
Rostropovich / Richter ; Yo-Yo Ma / Ax 1992	221	0.7834	< 0.001
Rostropovich / Richter ; Starker / Buchbinder	221	0.7371	< 0.001
Rostropovich / Richter ; Bylsma / Orkis	221	-0.1745	0.009
Rostropovich / Richter ; A Bekova / E Bekova	221	0.3868	< 0.001
Rostropovich / Richter ; Harrell / Kocacevich	221	-0.1571	0.019
Rostropovich / Richter ; Schiff / Oppitz	221	0.0648	0.338
Rostropovich / Richter ; Maisky / Gililov	221	-0.0395	0.559
Rostropovich / Richter ; Bengtasson / Kavtaradze	221	0.1721	0.01
Rostropovich / Richter ; Isserlis / Hough	221	-0.3518	< 0.001
Starker / Sebők ; du Pré / Barenboim	221	0.2361	< 0.001
Starker / Sebők ; Tortelier / de la Pau	221	0.1614	0.016
Starker / Sebők ; Harrell / Ashkenazy	221	0.3242	< 0.001
Starker / Sebők ; Shafran / Gottlieb	221	0.1576	0.019
Starker / Sebők ; Rose / Pommier	221	0.1928	0.004
Starker / Sebők ; Rostropovich / Serkin	221	0.1898	0.005
Starker / Sebők ; Isserlis / Evans	221	0.3235	< 0.001
Starker / Sebők ; Yo-Yo Ma / Ax 1985	221	0.1909	0.004
Starker / Sebők ; Yo-Yo Ma / Ax 1992	221	0.2804	< 0.001
Starker / Sebők ; Starker / Buchbinder	221	0.1881	0.005
Starker / Sebők ; Bylsma / Orkis	221	0.1241	0.065

Starker / Sebők ; A Bekova / E Bekova	221	0.156	0.02
Starker / Sebők ; Harrell / Kocacevich	221	0.0615	0.363
Starker / Sebők ; Schiff / Oppitz	221	0.1854	0.006
Starker / Sebők ; Maisky / Gililov	221	0.0786	0.245
Starker / Sebők ; Bengtasson / Kavtaradze	221	0.0458	0.498
Starker / Sebők ; Isserlis / Hough	221	-0.0071	0.916
du Pré / Barenboim ; Tortelier / de la Pau	221	0.2225	< 0.001
du Pré / Barenboim ; Harrell / Ashkenazy	221	0.2639	< 0.001
du Pré / Barenboim ; Shafran / Gottlieb	221	-0.0033	0.962
du Pré / Barenboim ; Rose / Pommier	221	0.2011	0.003
du Pré / Barenboim ; Rostropovich / Serkin	221	0.3758	< 0.001
du Pré / Barenboim ; Isserlis / Evans	221	0.2712	< 0.001
du Pré / Barenboim ; Yo-Yo Ma / Ax 1985	221	0.6432	< 0.001
du Pré / Barenboim ; Yo-Yo Ma / Ax 1992	221	0.2456	< 0.001
du Pré / Barenboim ; Starker / Buchbinder	221	0.3047	< 0.001
du Pré / Barenboim ; Bylsma / Orkis	221	0.4869	< 0.001
du Pré / Barenboim ; A Bekova / E Bekova	221	-0.1028	0.128
du Pré / Barenboim ; Harrell / Kocacevich	221	0.5179	< 0.001
du Pré / Barenboim ; Schiff / Oppitz	221	0.3825	< 0.001
du Pré / Barenboim ; Maisky / Gililov	221	-0.0734	0.277
du Pré / Barenboim ; Bengtasson / Kavtaradze	221	0.1384	0.04
du Pré / Barenboim ; Isserlis / Hough	221	-0.1341	0.046
Tortelier / de la Pau ; Harrell / Ashkenazy	221	0.5826	< 0.001
Tortelier / de la Pau ; Shafran / Gottlieb	221	0.4952	< 0.001
Tortelier / de la Pau ; Rose / Pommier	221	0.6726	< 0.001
Tortelier / de la Pau ; Rostropovich / Serkin	221	-0.2698	< 0.001
Tortelier / de la Pau ; Isserlis / Evans	221	0.4735	< 0.001
Tortelier / de la Pau ; Yo-Yo Ma / Ax 1985	221	-0.0472	0.486
Tortelier / de la Pau ; Yo-Yo Ma / Ax 1992	221	0.5547	< 0.001
Tortelier / de la Pau ; Starker / Buchbinder	221	0.5395	< 0.001
Tortelier / de la Pau ; Bylsma / Orkis	221	-0.2371	< 0.001
Tortelier / de la Pau ; A Bekova / E Bekova	221	0.4217	< 0.001
Tortelier / de la Pau ; Harrell / Kocacevich	221	-0.094	0.164
Tortelier / de la Pau ; Schiff / Oppitz	221	0.0325	0.631
Tortelier / de la Pau ; Maisky / Gililov	221	0.2242	0.2242
Tortelier / de la Pau ; Bengtasson / Kavtaradze	221	0.0782	0.247
Tortelier / de la Pau ; Isserlis / Hough	221	-0.198	0.003
Harrell / Ashkenazy ; Shafran / Gottlieb	221	0.4984	< 0.001
Harrell / Ashkenazy ; Rose / Pommier	221	0.5229	< 0.001
Harrell / Ashkenazy ; Rostropovich / Serkin	221	-0.0782	0.247
Harrell / Ashkenazy ; Isserlis / Evans	221	0.6359	< 0.001
Harrell / Ashkenazy ; Yo-Yo Ma / Ax 1985	221	0.0019	0.977
Harrell / Ashkenazy ; Yo-Yo Ma / Ax 1992	221	0.6379	< 0.001
Harrell / Ashkenazy ; Starker / Buchbinder	221	0.7005	< 0.001
Harrell / Ashkenazy ; Bylsma / Orkis	221	-0.0417	0.537
Harrell / Ashkenazy ; A Bekova / E Bekova	221	0.4698	< 0.001

Harrell / Ashkenazy ; Harrell / Kocacevich	221	-0.0846	0.21
Harrell / Ashkenazy ; Schiff / Oppitz	221	0.1113	0.099
Harrell / Ashkenazy ; Maisky / Gililov	221	0.0767	0.256
Harrell / Ashkenazy ; Bengtasson / Kavtaradze	221	0.1403	0.037
Harrell / Ashkenazy ; Isserlis / Hough	221	-0.2355	< 0.001
Shafran / Gottlieb ; Rose / Pommier	221	0.5596	< 0.001
Shafran / Gottlieb ; Rostropovich / Serkin	221	-0.1989	0.003
Shafran / Gottlieb ; Isserlis / Evans	221	0.3553	< 0.001
Shafran / Gottlieb ; Yo-Yo Ma / Ax 1985	221	-0.1688	0.012
Shafran / Gottlieb ; Yo-Yo Ma / Ax 1992	221	0.4837	< 0.001
Shafran / Gottlieb ; Starker / Buchbinder	221	0.4433	< 0.001
Shafran / Gottlieb ; Bylsma / Orkis	221	-0.2194	< 0.001
Shafran / Gottlieb ; A Bekova / E Bekova	221	0.521	< 0.001
Shafran / Gottlieb ; Harrell / Kocacevich	221	-0.3156	< 0.001
Shafran / Gottlieb ; Schiff / Oppitz	221	-0.1528	0.023
Shafran / Gottlieb ; Maisky / Gililov	221	0.2315	< 0.001
Shafran / Gottlieb ; Bengtasson / Kavtaradze	221	-0.0798	0.237
Shafran / Gottlieb ; Isserlis / Hough	221	-0.0927	0.17
Rose / Pommier ; Rostropovich / Serkin	221	-0.2507	< 0.001
Rose / Pommier ; Isserlis / Evans	221	0.364	< 0.001
Rose / Pommier ; Yo-Yo Ma / Ax 1985	221	-0.0088	0.897
Rose / Pommier ; Yo-Yo Ma / Ax 1992	221	0.5062	< 0.001
Rose / Pommier ; Starker / Buchbinder	221	0.4986	< 0.001
Rose / Pommier ; Bylsma / Orkis	221	-0.1691	0.012
Rose / Pommier ; A Bekova / E Bekova	221	0.4665	< 0.001
Rose / Pommier ; Harrell / Kocacevich	221	-0.16	0.017
Rose / Pommier ; Schiff / Oppitz	221	0.0004	0.995
Rose / Pommier ; Maisky / Gililov	221	0.2588	< 0.001
Rose / Pommier ; Bengtasson / Kavtaradze	221	0.1016	0.132
Rose / Pommier ; Isserlis / Hough	221	-0.1983	0.003
Rostropovich / Serkin ; Isserlis / Evans	221	-0.0232	0.732
Rostropovich / Serkin ; Yo-Yo Ma / Ax 1985	221	0.5493	< 0.001
Rostropovich / Serkin ; Yo-Yo Ma / Ax 1992	221	0.0652	< 0.001
Rostropovich / Serkin ; Starker / Buchbinder	221	-0.0217	0.748
Rostropovich / Serkin ; Bylsma / Orkis	221	0.4778	< 0.001
Rostropovich / Serkin ; A Bekova / E Bekova	221	-0.0995	0.14
Rostropovich / Serkin ; Harrell / Kocacevich	221	0.4309	< 0.001
Rostropovich / Serkin ; Schiff / Oppitz	221	0.4654	< 0.001
Rostropovich / Serkin ; Maisky / Gililov	221	-0.0965	0.153
Rostropovich / Serkin ; Bengtasson / Kavtaradze	221	0.0733	0.278
Rostropovich / Serkin ; Isserlis / Hough	221	0.1083	0.108
Isserlis / Evans ; Yo-Yo Ma / Ax 1985	221	-0.0464	0.492
Isserlis / Evans ; Yo-Yo Ma / Ax 1992	221	0.6582	< 0.001
Isserlis / Evans ; Starker / Buchbinder	221	0.598	< 0.001
Isserlis / Evans ; Bylsma / Orkis	221	-0.1317	0.051
Isserlis / Evans ; A Bekova / E Bekova	221	0.2481	< 0.001

Isserlis / Evans ; Harrell / Kocacevich	221	0.0106	0.875
Isserlis / Evans ; Schiff / Oppitz	221	0.1643	0.014
Isserlis / Evans ; Maisky / Gililov	221	-0.1164	0.084
Isserlis / Evans ; Bengtasson / Kavtaradze	221	0.1341	0.046
Isserlis / Evans ; Isserlis / Hough	221	-0.2058	0.002
Yo-Yo Ma / Ax 1985 ; Yo-Yo Ma / Ax 1992	221	0.0472	0.485
Yo-Yo Ma / Ax 1985 ; Starker / Buchbinder	221	0.0031	0.964
Yo-Yo Ma / Ax 1985 ; Bylsma / Orkis	221	0.6292	< 0.001
Yo-Yo Ma / Ax 1985 ; A Bekova / E Bekova	221	-0.1033	0.126
Yo-Yo Ma / Ax 1985 ; Harrell / Kocacevich	221	-0.1033	0.126
Yo-Yo Ma / Ax 1985 ; Schiff / Oppitz	221	0.6022	< 0.001
Yo-Yo Ma / Ax 1985 ; Maisky / Gililov	221	0.0752	0.266
Yo-Yo Ma / Ax 1985 ; Bengtasson / Kavtaradze	221	0.0606	0.37
Yo-Yo Ma / Ax 1985 ; Isserlis / Hough	221	0.022	0.744
Yo-Yo Ma / Ax 1992 ; Starker / Buchbinder	221	0.6249	< 0.001
Yo-Yo Ma / Ax 1992 ; Bylsma / Orkis	221	-0.1942	0.004
Yo-Yo Ma / Ax 1992 ; A Bekova / E Bekova	221	0.4006	< 0.001
Yo-Yo Ma / Ax 1992 ; Harrell / Kocacevich	221	-0.0915	0.175
Yo-Yo Ma / Ax 1992 ; Schiff / Oppitz	221	0.1465	0.029
Yo-Yo Ma / Ax 1992 ; Maisky / Gililov	221	-0.0705	0.297
Yo-Yo Ma / Ax 1992 ; Bengtasson / Kavtaradze	221	0.2024	0.003
Yo-Yo Ma / Ax 1992 ; Isserlis / Hough	221	-0.2963	< 0.001
Starker / Buchbinder ; Bylsma / Orkis	221	-0.1424	0.034
Starker / Buchbinder ; A Bekova / E Bekova	221	0.3035	< 0.001
Starker / Buchbinder ; Harrell / Kocacevich	221	-0.0777	0.25
Starker / Buchbinder ; Schiff / Oppitz	221	0.0937	0.165
Starker / Buchbinder ; Maisky / Gililov	221	-0.0845	0.211
Starker / Buchbinder ; Bengtasson / Kavtaradze	221	0.1596	0.018
Starker / Buchbinder ; Isserlis / Hough	221	-0.2187	0.001
Bylsma / Orkis ; A Bekova / E Bekova	221	-0.1417	0.035
Bylsma / Orkis ; Harrell / Kocacevich	221	0.55	< 0.001
Bylsma / Orkis ; Schiff / Oppitz	221	0.3768	< 0.001
Bylsma / Orkis ; Maisky / Gililov	221	0.0612	0.365
Bylsma / Orkis ; Bengtasson / Kavtaradze	221	0.1407	0.037
Bylsma / Orkis ; Isserlis / Hough	221	0.1324	0.049
A Bekova / E Bekova ; Harrell / Kocacevich	221	-0.1224	0.069
A Bekova / E Bekova ; Schiff / Oppitz	221	0.0317	0.64
A Bekova / E Bekova ; Maisky / Gililov	221	0.408	< 0.001
A Bekova / E Bekova ; Bengtasson / Kavtaradze	221	-0.0791	0.242
A Bekova / E Bekova ; Isserlis / Hough	221	-0.0004	0.996
Harrell / Kocacevich ; Schiff / Oppitz	221	0.4518	< 0.001
Harrell / Kocacevich ; Maisky / Gililov	221	-0.1035	0.125
Harrell / Kocacevich ; Bengtasson / Kavtaradze	221	-0.0569	0.4
Harrell / Kocacevich ; Isserlis / Hough	221	0.1887	0.005
Schiff / Oppitz ; Maisky / Gililov	221	-0.0941	0.163
Schiff / Oppitz ; Bengtasson / Kavtaradze	221	0.1779	0.008

Schiff / Oppitz ; Isserlis / Hough	221	0.0861	0.203
Maisky / Gililov ; Bengtasson / Kavtaradze	221	-0.2468	< 0.001
Maisky / Gililov ; Isserlis / Hough	221	0.1515	0.024
Bengtasson / Kavtaradze ; Isserlis / Hough	221	-0.1276	0.058

The expressive timing data deriving from the modelling equation are called algorithmic expressive timing data, which are built by considering the specific individual style of musical expression in performance. Once the algorithmic expressive timing data of the individual style are calculated through the statistical modelling method, the computation of correlation rates between the two performances indicates how the individual style of two performances correlate with each other. A correlation analysis of the algorithmic expressive timing data (see Table 4.5) of the second movement of the E minor Cello Sonata, however, provides a contrasting finding to the expressive timing at IBI level data.

In performing the Menuet of the E minor cello sonata, Harrison's style is characterised by over-dotted rhythm and rushed rhythmic playing. No similarity in tempo modification is found between Harrison's style and that of her contemporaries, such as Feuermann (r = 0.12, p = 0.008) and Piatigorsky (r = 0.02, p = 0.39), although a fair similarity in styles is detected between Harrison's timing fluctuation, du Pré's (r = 0.25, p = 0.0004) and Schiff's (r = 0.28, p = 0.000008). The identification of non-similarity of expressive timing between pre-WW2 styles (cellists of both the Klengel and Becker lineages, for instance) could mean that pre-WW2 expressive timing represents artistic individuality more than pedagogical and/or historical trends.

In performing the Menuet of the E minor cello sonata, Harrison's style is characterised by over-dotted rhythm and rushed rhythmic playing. No similarity in tempo modification is found between Harrison's style. The difference in Harrison's style from that of the younger generation could be explained by historical trends, as well as the fact that Harrison was more interested in her performing career than teaching. The identification of non-similarity of expressive timing between pre-WW2 styles (cellists of both Klengel and Becker lineages, for instance) could mean that artistic individualities might be the crucial element in pre-WW2 expressive timing.

Gendron's expressive timing flows naturally with the music's ebb and flow and appears to be similar to the expressive timing of several other renditions, including his French contemporaries Fournier (r = 0.54; $p < 0.001$) and Tortelier (r = 0.56; $p < 0.001$). The most interesting aspect is discovered with reference to similarity in shaping expressive timing between Gendron and the cellists with multiple renditions, such as Rostropovich and Ma. For

instance, the expressive timing of Rostropovich's 1957 rendition ($r = 0.51$; $p < 0.001$) shows a fair similarity with Gendron's, whereas Rostropovich's 1983 version ($r = -0.06$; $p = 0.33$) does not. As for Ma's case, although the interval between the two recordings is only seven years and the ensemble partner is the same in both cases, contrasting similarities in expressive timing were discovered between Gendron and the two renditions by Ma. In this case, the expressive timing of Ma's 1992 rendition ($r = 0.57$; $p < 0.001$) shows a fair similarity to Gendron's, whereas the 1985 rendition ($r = 0.008$; $p = 0.9$) does not.

Earlier, I remarked on critics' non-judgemental views of the 1950s renditions. It is interesting to notice the similarity in expressive timing between 1950s in addition to French cello playing. Judging from the fact on balanced record reviews and the similarity data, one might presume that a certain kind of standardised interpretation of expressive timing might have been available by the 1950s and/or French cello playing.

Starker is the only artist for whom three renditions are available for analysis of the repertoire. It was noted earlier that his "phenomenal technique" (Fiske 1955a: 50) and virtuosity received good reviews in the 1950s. The question here is to establish whether his performance style stays the same or changes in the course of time. The findings suggest that Starker's expressive timings in the three renditions do not seem to correlate with one another. At this point, let us investigate whether the expressive timing of his 1957 rendition shows any similarities with other renditions. Starker/Boggin's expressive timing shows a fair similarity with Fournier's Rostropovich's 1957 rendition (but not with Rostropovich's 1983 one), Tortelier, 1980 Harrell, Rose, and Ma's 1992 (but not with Ma's 1985 version). One interesting aspect is found between Fournier and Starker. That is, whilst Fiske's (1955b) evaluation contrasted between the "mellow lyricism" of Fournier and the "phenomenal technique" of Starker, finding suggest that the expressive timing is similar between the two performances. It can be suggested that in spite of the fact that statistically significant similarity might exist between the two performances, distinctive characteristics are perceived more efficiently in subjective evaluation, which is recorded as a review.

Fournier's expressive timing is similar to Rostropovich's in 1957 (but not with his 1983 version) and also to Tortelier's Harrell's 1980 rendition (but not the 1997 one), Rose's Isserlis' 1982 rendition (but not the 2000 version), and Ma's 1992 rendition (but not the 1985 one). It can be suggested that Fournier's expressive timing shows some similarities with performances recorded between the 1950s and early 1980s. The expressive timing of Rostropovich's 1957 recording with Richter is not similar ($r = -0.0929$; $p = 0.169$) to the expressive timing of his much better known recording of 1983 with Serkin. However, as seen

in the Fournier rendition, the expressive timing of Rostropovich's 1957 version shows some similarities with performances recorded between the 1950s and early 1980s, including Tortelier, Shafran, Rose, Isserlis' 1982 version, as well as Starker's 1995 rendition.

du Pré's timing style includes rubato on every downbeat in section A. The reception of this particular recording suggests that du Pré's expressive timing was observed as intentional, therefore leading listeners to the new majestic version of "unfold[ing] Brahms" to one critic (Anderson 1969), but her timing fluctuation was perceived as distressing to another (J.O.C. 1968) because the cellist's rhythm and tempo "extract the very last drop out of every single note". In spite of the mixed receptions, it appears that du Pré's timing fluctuation seemingly influenced artists who recorded Brahms after her release. That is, according to my empirical data, du Pré's expressive timing is fairly similar to that of Ma's 1985 rendition (r = 0.6432; $p < 0.001$) and Harrell's 1997 one (r = 0.5179; $p < 0.001$). Note that whilst both Ma and Harrell recorded the Brahms twice, on the comparison with du Pré's expressive timing, one pair each; shows similarity, whereas another pairs do not.

Similar cases with du Pré' in relation to Ma and Harrell's expressive timing are found in Tortelier's case. Tortelier's expressive timing is similar to Harrell's in the 1980s (r = 0.5826; $p < 0.001$) and Ma's 1992 rendition (r = 0.5547; $p < 0.001$), but does not show any similarity with Harrell's 1997 and Ma's 1985 versions. Rose (r = 0.6726; $p < 0.001$) and Starker's 1995 rendition (r = 0.5395; $p < 0.001$) also show similarities with Tortelier's expressive timing.

As anticipated from the earlier findings, no similarity is found between the expressive timing of Harrell's 1980 and 1997 renditions (r = -0.0846; p = 0.21). Although it has already been identified that the expressive timing of Harrell's two performance may differ, it is worth considering whether there are any similarities in expressive timing in the teacher-student relationships. As explained earlier, both Harrell and Ma were taught by Rose. Harrell's expressive timing in 1980 is similar to his teacher Rose's expressive timing (r = 0.5229; $p < 0.001$) and to Ma's 1992 version (r = 0.6379; $p < 0.001$), which indicates a partial correlation of similarity in the teacher-student relationship. In addition, Harrell's expressive timing in 1980 also shows similarities with Isselis' 1984 and Starker's 1995 renditions.

Shafran's expressive timing is similar to Rose's (r = 0.5596; $p < 0.001$). Another partial correlation of the teacher-student relationship in the shaping of expressive timing is found between Rose and Ma's 1992 rendition (r = 0.5062; $p < 0.001$). The expressive timing of the two Grammy awarded performances, Rostropovich's in 1983 and Ma's in 1985, is similar to each other (r = 0.5493; $p < 0.001$).

Isserlis' 1984 version shows similarity to Ma's 1992 one ($r = 0.6582$; $p < 0.001$), and Starker's from 1995 ($r = 0.598$; $p < 0.001$). Whilst the expressive timing of Ma's two recordings indicates little similarity to each other, Ma's 1985 is to Bylsma's ($r = 0.6292$; $p < 0.001$), and Schiff's ($r = 0.6022$; $p < 0.001$), and Ma's 1992 is to Starker's 1995 ($r = 0.6249$; $p < 0.001$). Bylsma's expressive timing is similar to Harrell's 1998 rendition ($r = 0.55$; $p < 0.001$).

Although the level of similarity in expressive timing between the much talked about renditions, such as those of du Pré, Rostropovich, Yo-Yo Ma and the younger generation, this might be coincidental rather than intentional, it is worth noting in terms of the changing taste in styles between the 1960s to 1980s reception and the 1990s performance trends. Similarities in style between the 1960s, 1980s and 1990s performances can be explained by the fact that during the period of the 1960s to 1980s the blended role style was established, which recorded artists in the 1990s chose to follow, whilst adding their own personality.

- **The second movement of the F major sonata**

Let us now consider the expressive timing of the F major sonata. As with the E minor sonata performances, fair similarity ($r = 0.3$~0.8, $p < 0.001$) in handling expressive timing at IBI level data is identified between performances of the second movement of the F major Cello Sonata. A correlation analysis of the algorithmic expressive timing data of the second movement of the sonata provides a contrasting finding to the expressive timing at IBI level data.

Table 4.6. Relative level of expressive timing data: F major

x ; y	*N*	*r*	*p*
Casals / Horszowski ; Pleeth / Good	141	-0.0198	0.815
Casals / Horszowski ; Rose / Owen	141	0.0894	0.29
Casals / Horszowski ; Mainardi / Zecchi	141	-0.0472	0.577
Casals / Horszowski ; Fournier / Backhaus	141	-0.0805	0.341
Casals / Horszowski ; Rostropovich / Richter	141	-0.0197	0.816
Casals / Horszowski ; Starker / Sebők	141	-0.0526	0.534
Casals / Horszowski ; Piatigorsky / Rubinstein	141	0.0085	0.92
Casals / Horszowski ; du Pré / Barenboim	141	0.0344	0.685
Casals / Horszowski ; Tortelier / de la Pau	141	-0.0298	0.725
Casals / Horszowski ; Harrell / Ashkenazy	141	-0.0313	0.712
Casals / Horszowski ; Shafran / Gottlieb	141	0.1193	0.157
Casals / Horszowski ; Rose / Pommier	141	0.0605	0.474

Casals / Horszowski ; Rostropovich / Serkin	141	0.0238	0.778
Casals / Horszowski ; Isserlis / Evans	141	-0.119	0.158
Casals / Horszowski ; Yo-Yo Ma / Ax 1985	141	-0.018	0.832
Casals / Horszowski ; Yo-Yo Ma / Ax 1992	141	0.0022	0.979
Casals / Horszowski ; Starker / Buchbinder	141	0.0243	0.774
Casals / Horszowski ; Bylsma / Orkis	141	-0.0034	0.968
Casals / Horszowski ; A Bekova / E Bekova	141	-0.1773	0.035
Casals / Horszowski ; Harrell / Kocacevich	141	-0.0209	0.805
Casals / Horszowski ; Schiff / Oppitz	141	0.1361	0.106
Casals / Horszowski ; Maisky / Gililov	141	-0.0802	0.343
Casals / Horszowski ; Bengtasson / Kavtaradze	141	0.0083	0.922
Casals / Horszowski ; Isserlis / Hough	141	-0.1205	0.153
Pleeth / Good ; Rose / Owen	141	0.235	0.005
Pleeth / Good ; Mainardi / Zecchi	141	0.4445	< 0.001
Pleeth / Good ; Fournier / Backhaus	141	0.3509	< 0.001
Pleeth / Good ; Rostropovich / Richter	141	0.322	< 0.001
Pleeth / Good ; Starker / Sebők	141	0.3145	< 0.001
Pleeth / Good ; Piatigorsky / Rubinstein	141	0.0527	0.533
Pleeth / Good ; du Pré / Barenboim	141	0.0177	0.835
Pleeth / Good ; Tortelier / de la Pau	141	0.3421	< 0.001
Pleeth / Good ; Harrell / Ashkenazy	141	0.2329	0.005
Pleeth / Good ; Shafran / Gottlieb	141	0.3323	< 0.001
Pleeth / Good ; Rose / Pommier	141	0.2961	< 0.001
Pleeth / Good ; Rostropovich / Serkin	141	0.1049	0.214
Pleeth / Good ; Isserlis / Evans	141	0.2839	< 0.001
Pleeth / Good ; Yo-Yo Ma / Ax 1985	141	0.1343	0.111
Pleeth / Good ; Yo-Yo Ma / Ax 1992	141	0.2807	< 0.001
Pleeth / Good ; Starker / Buchbinder	141	0.22	0.009
Pleeth / Good ; Bylsma / Orkis	141	-0.116	0.169
Pleeth / Good ; A Bekova / E Bekova	141	0.0887	0.294
Pleeth / Good ; Harrell / Kocacevich	141	0.1364	0.106
Pleeth / Good ; Schiff / Oppitz	141	0.0094	0.911
Pleeth / Good ; Maisky / Gililov	141	0.0036	0.966
Pleeth / Good ; Bengtasson / Kavtaradze	141	0.1342	0.111
Pleeth / Good ; Isserlis / Hough	141	-0.0428	0.613
Rose / Owen ; Mainardi / Zecchi	141	0.4338	< 0.001
Rose / Owen ; Fournier / Backhaus	141	0.6032	< 0.001
Rose / Owen ; Rostropovich / Richter	141	0.544	< 0.001
Rose / Owen ; Starker / Sebők	141	0.201	0.016
Rose / Owen ; Piatigorsky / Rubinstein	141	0.0559	0.509
Rose / Owen ; du Pré / Barenboim	141	0.1008	0.233
Rose / Owen ; Tortelier / de la Pau	141	0.5852	< 0.001
Rose / Owen ; Harrell / Ashkenazy	141	0.5291	< 0.001
Rose / Owen ; Shafran / Gottlieb	141	0.3218	< 0.001

Rose / Owen ; Rose / Pommier	141	0.6071	< 0.001
Rose / Owen ; Rostropovich / Serkin	141	-0.0854	0.312
Rose / Owen ; Isserlis / Evans	141	0.5856	< 0.001
Rose / Owen ; Yo-Yo Ma / Ax 1985	141	-0.0694	0.412
Rose / Owen ; Yo-Yo Ma / Ax 1992	141	0.5363	< 0.001
Rose / Owen ; Starker / Buchbinder	141	0.5533	< 0.001
Rose / Owen ; Bylsma / Orkis	141	-0.43	< 0.001
Rose / Owen ; A Bekova / E Bekova	141	-0.4186	< 0.001
Rose / Owen ; Harrell / Kocacevich	141	0.502	< 0.001
Rose / Owen ; Schiff / Oppitz	141	0.5144	< 0.001
Rose / Owen ; Maisky / Gililov	141	0.0401	0.635
Rose / Owen ; Bengtasson / Kavtaradze	141	0.5654	< 0.001
Rose / Owen ; Isserlis / Hough	141	-0.3308	< 0.001
Mainardi / Zecchi ; Fournier / Backhaus	141	0.4649	< 0.001
Mainardi / Zecchi ; Rostropovich / Richter	141	0.4633	< 0.001
Mainardi / Zecchi ; Starker / Sebők	141	0.4517	< 0.001
Mainardi / Zecchi ; Piatigorsky / Rubinstein	141	0.0625	0.46
Mainardi / Zecchi ; du Pré / Barenboim	141	0.0331	0.695
Mainardi / Zecchi ; Tortelier / de la Pau	141	0.5245	< 0.001
Mainardi / Zecchi ; Harrell / Ashkenazy	141	0.4532	< 0.001
Mainardi / Zecchi ; Shafran / Gottlieb	141	0.53	< 0.001
Mainardi / Zecchi ; Rose / Pommier	141	0.3712	< 0.001
Mainardi / Zecchi ; Rostropovich / Serkin	141	0.0483	0.568
Mainardi / Zecchi ; Isserlis / Evans	141	0.5178	< 0.001
Mainardi / Zecchi ; Yo-Yo Ma / Ax 1985	141	0.248	0.003
Mainardi / Zecchi ; Yo-Yo Ma / Ax 1992	141	0.6441	< 0.001
Mainardi / Zecchi ; Starker / Buchbinder	141	0.4759	< 0.001
Mainardi / Zecchi ; Bylsma / Orkis	141	-0.3241	< 0.001
Mainardi / Zecchi ; A Bekova / E Bekova	141	0.0864	0.306
Mainardi / Zecchi ; Harrell / Kocacevich	141	0.1853	0.027
Mainardi / Zecchi ; Schiff / Oppitz	141	0.1796	0.032
Mainardi / Zecchi ; Maisky / Gililov	141	-0.1692	0.044
Mainardi / Zecchi ; Bengtasson / Kavtaradze	141	0.3892	< 0.001
Mainardi / Zecchi ; Isserlis / Hough	141	-0.0828	0.327
Fournier / Backhaus ; Rostropovich / Richter	141	0.558	< 0.001
Fournier / Backhaus ; Starker / Sebők	141	0.341	< 0.001
Fournier / Backhaus ; Piatigorsky / Rubinstein	141	0.0965	0.253
Fournier / Backhaus ; du Pré / Barenboim	141	0.1916	0.022
Fournier / Backhaus ; Tortelier / de la Pau	141	0.6091	< 0.001
Fournier / Backhaus ; Harrell / Ashkenazy	141	0.551	< 0.001
Fournier / Backhaus ; Shafran / Gottlieb	141	0.322	< 0.001
Fournier / Backhaus ; Rose / Pommier	141	0.6638	< 0.001
Fournier / Backhaus ; Rostropovich / Serkin	141	0.0178	0.833
Fournier / Backhaus ; Isserlis / Evans	141	0.6053	< 0.001

Fournier / Backhaus ; Yo-Yo Ma / Ax 1985	141	0.0425	0.615
Fournier / Backhaus ; Yo-Yo Ma / Ax 1992	141	0.4762	< 0.001
Fournier / Backhaus ; Starker / Buchbinder	141	0.5092	< 0.001
Fournier / Backhaus ; Bylsma / Orkis	141	-0.36	< 0.001
Fournier / Backhaus ; A Bekova / E Bekova	141	-0.2358	0.005
Fournier / Backhaus ; Harrell / Kocacevich	141	0.3873	< 0.001
Fournier / Backhaus ; Schiff / Oppitz	141	0.1617	0.055
Fournier / Backhaus ; Maisky / Gililov	141	-0.1412	0.094
Fournier / Backhaus ; Bengtasson / Kavtaradze	141	0.5125	< 0.001
Fournier / Backhaus ; Isserlis / Hough	141	-0.082	0.332
Rostropovich / Richter ; Starker / Sebők	141	0.4942	< 0.001
Rostropovich / Richter ; Piatigorsky / Rubinstein	141	0.091	0.281
Rostropovich / Richter ; du Pré / Barenboim	141	0.2087	0.013
Rostropovich / Richter ; Tortelier / de la Pau	141	0.5263	< 0.001
Rostropovich / Richter ; Harrell / Ashkenazy	141	0.5335	< 0.001
Rostropovich / Richter ; Shafran / Gottlieb	141	0.4401	< 0.001
Rostropovich / Richter ; Rose / Pommier	141	0.5138	< 0.001
Rostropovich / Richter ; Rostropovich / Serkin	141	0.1434	0.089
Rostropovich / Richter ; Isserlis / Evans	141	0.5115	< 0.001
Rostropovich / Richter ; Yo-Yo Ma / Ax 1985	141	0.0032	0.97
Rostropovich / Richter ; Yo-Yo Ma / Ax 1992	141	0.572	< 0.001
Rostropovich / Richter ; Starker / Buchbinder	141	0.6055	< 0.001
Rostropovich / Richter ; Bylsma / Orkis	141	-0.3142	< 0.001
Rostropovich / Richter ; A Bekova / E Bekova	141	-0.143	< 0.001
Rostropovich / Richter ; Harrell / Kocacevich	141	0.2515	0.003
Rostropovich / Richter ; Schiff / Oppitz	141	0.3447	< 0.001
Rostropovich / Richter ; Maisky / Gililov	141	-0.1699	0.043
Rostropovich / Richter ; Bengtasson / Kavtaradze	141	0.4166	< 0.001
Rostropovich / Richter ; Isserlis / Hough	141	-0.0805	0.341
Starker / Sebők ; Piatigorsky / Rubinstein	141	0.0384	0.65
Starker / Sebők ; du Pré / Barenboim	141	0.2816	< 0.001
Starker / Sebők ; Tortelier / de la Pau	141	0.428	< 0.001
Starker / Sebők ; Harrell / Ashkenazy	141	0.2603	0.002
Starker / Sebők ; Shafran / Gottlieb	141	0.4706	< 0.001
Starker / Sebők ; Rose / Pommier	141	0.2328	0.005
Starker / Sebők ; Rostropovich / Serkin	141	0.0602	0.476
Starker / Sebők ; Isserlis / Evans	141	0.2938	< 0.001
Starker / Sebők ; Yo-Yo Ma / Ax 1985	141	0.2313	0.006
Starker / Sebők ; Yo-Yo Ma / Ax 1992	141	0.4352	< 0.001
Starker / Sebők ; Starker / Buchbinder	141	0.6742	< 0.001
Starker / Sebők ; Bylsma / Orkis	141	-0.2592	0.002
Starker / Sebők ; A Bekova / E Bekova	141	0.0483	0.569
Starker / Sebők ; Harrell / Kocacevich	141	0.099	0.241
Starker / Sebők ; Schiff / Oppitz	141	0.2741	< 0.001

Starker / Sebők ; Maisky / Gililov	141	-0.2629	0.002
Starker / Sebők ; Bengtasson / Kavtaradze	141	0.1713	0.042
Starker / Sebők ; Isserlis / Hough	141	-0.1295	0.125
Piatigorsky / Rubinstein ; du Pré / Barenboim	141	-0.0353	0.676
Piatigorsky / Rubinstein ; Tortelier / de la Pau	141	0.1213	0.151
Piatigorsky / Rubinstein ; Harrell / Ashkenazy	141	0.1587	0.059
Piatigorsky / Rubinstein ; Shafran / Gottlieb	141	-0.015	0.86
Piatigorsky / Rubinstein ; Rose / Pommier	141	0.0635	0.453
Piatigorsky / Rubinstein ; Rostropovich / Serkin	141	0.0336	0.692
Piatigorsky / Rubinstein ; Isserlis / Evans	141	0.1415	0.093
Piatigorsky / Rubinstein ; Yo-Yo Ma / Ax 1985	141	-0.0591	0.485
Piatigorsky / Rubinstein ; Yo-Yo Ma / Ax 1992	141	0.0508	0.549
Piatigorsky / Rubinstein ; Starker / Buchbinder	141	0.0988	0.242
Piatigorsky / Rubinstein ; Bylsma / Orkis	141	-0.0567	0.502
Piatigorsky / Rubinstein ; A Bekova / E Bekova	141	-0.1318	0.118
Piatigorsky / Rubinstein ; Harrell / Kocacevich	141	-0.0007	0.993
Piatigorsky / Rubinstein ; Schiff / Oppitz	141	0.0041	0.961
Piatigorsky / Rubinstein ; Maisky / Gililov	141	-0.0854	0.312
Piatigorsky / Rubinstein ; Bengtasson / Kavtaradze	141	0.2145	0.01
Piatigorsky / Rubinstein ; Isserlis / Hough	141	0.1294	0.125
du Pré / Barenboim ; Tortelier / de la Pau	141	0.3697	< 0.001
du Pré / Barenboim ; Harrell / Ashkenazy	141	0.1172	0.165
du Pré / Barenboim ; Shafran / Gottlieb	141	0.2326	0.005
du Pré / Barenboim ; Rose / Pommier	141	0.2448	0.003
du Pré / Barenboim ; Rostropovich / Serkin	141	-0.0222	0.793
du Pré / Barenboim ; Isserlis / Evans	141	0.1971	0.019
du Pré / Barenboim ; Yo-Yo Ma / Ax 1985	141	-0.1153	0.172
du Pré / Barenboim ; Yo-Yo Ma / Ax 1992	141	0.0431	0.611
du Pré / Barenboim ; Starker / Buchbinder	141	0.3373	< 0.001
du Pré / Barenboim ; Bylsma / Orkis	141	-0.2522	0.002
du Pré / Barenboim ; A Bekova / E Bekova	141	-0.2228	0.008
du Pré / Barenboim ; Harrell / Kocacevich	141	0.2073	0.013
du Pré / Barenboim ; Schiff / Oppitz	141	0.272	0.001
du Pré / Barenboim ; Maisky / Gililov	141	-0.0146	0.863
du Pré / Barenboim ; Bengtasson / Kavtaradze	141	0.1865	0.026
du Pré / Barenboim ; Isserlis / Hough	141	-0.2292	0.006
Tortelier / de la Pau ; Harrell / Ashkenazy	141	0.584	< 0.001
Tortelier / de la Pau ; Shafran / Gottlieb	141	0.4006	< 0.001
Tortelier / de la Pau ; Rose / Pommier	141	0.6212	< 0.001
Tortelier / de la Pau ; Rostropovich / Serkin	141	0.0643	0.447
Tortelier / de la Pau ; Isserlis / Evans	141	0.6423	< 0.001
Tortelier / de la Pau ; Yo-Yo Ma / Ax 1985	141	0.1136	0.178
Tortelier / de la Pau ; Yo-Yo Ma / Ax 1992	141	0.4921	< 0.001
Tortelier / de la Pau ; Starker / Buchbinder	141	0.6106	< 0.001

Tortelier / de la Pau ; Bylsma / Orkis	141	-0.4744	< 0.001
Tortelier / de la Pau ; A Bekova / E Bekova	141	-0.2168	0.01
Tortelier / de la Pau ; Harrell / Kocacevich	141	0.328	< 0.001
Tortelier / de la Pau ; Schiff / Oppitz	141	0.3214	< 0.001
Tortelier / de la Pau ; Maisky / Gililov	141	-0.0999	0.237
Tortelier / de la Pau ; Bengtasson / Kavtaradze	141	0.5279	< 0.001
Tortelier / de la Pau ; Isserlis / Hough	141	-0.1527	0.07
Harrell / Ashkenazy ; Shafran / Gottlieb	141	0.2002	0.017
Harrell / Ashkenazy ; Rose / Pommier	141	0.5111	< 0.001
Harrell / Ashkenazy ; Rostropovich / Serkin	141	0.051	0.547
Harrell / Ashkenazy ; Isserlis / Evans	141	0.5391	< 0.001
Harrell / Ashkenazy ; Yo-Yo Ma / Ax 1985	141	0.0116	0.891
Harrell / Ashkenazy ; Yo-Yo Ma / Ax 1992	141	0.3886	< 0.001
Harrell / Ashkenazy ; Starker / Buchbinder	141	0.458	< 0.001
Harrell / Ashkenazy ; Bylsma / Orkis	141	-0.3519	< 0.001
Harrell / Ashkenazy ; A Bekova / E Bekova	141	-0.3239	< 0.001
Harrell / Ashkenazy ; Harrell / Kocacevich	141	0.1115	0.186
Harrell / Ashkenazy ; Schiff / Oppitz	141	0.1802	0.032
Harrell / Ashkenazy ; Maisky / Gililov	141	-0.0111	0.896
Harrell / Ashkenazy ; Bengtasson / Kavtaradze	141	0.5719	< 0.001
Harrell / Ashkenazy ; Isserlis / Hough	141	0.0437	0.606
Shafran / Gottlieb ; Rose / Pommier	141	0.2731	0.001
Shafran / Gottlieb ; Rostropovich / Serkin	141	-0.0033	0.969
Shafran / Gottlieb ; Isserlis / Evans	141	0.2959	< 0.001
Shafran / Gottlieb ; Yo-Yo Ma / Ax 1985	141	0.2301	0.006
Shafran / Gottlieb ; Yo-Yo Ma / Ax 1992	141	0.4784	< 0.001
Shafran / Gottlieb ; Starker / Buchbinder	141	0.4832	< 0.001
Shafran / Gottlieb ; Bylsma / Orkis	141	-0.2597	0.002
Shafran / Gottlieb ; A Bekova / E Bekova	141	0.1752	0.037
Shafran / Gottlieb ; Harrell / Kocacevich	141	0.2286	0.006
Shafran / Gottlieb ; Schiff / Oppitz	141	0.2131	0.011
Shafran / Gottlieb ; Maisky / Gililov	141	-0.1622	0.054
Shafran / Gottlieb ; Bengtasson / Kavtaradze	141	0.2053	0.014
Shafran / Gottlieb ; Isserlis / Hough	141	-0.2206	0.008
Rose / Pommier ; Rostropovich / Serkin	141	-0.0187	0.825
Rose / Pommier ; Isserlis / Evans	141	0.606	< 0.001
Rose / Pommier ; Yo-Yo Ma / Ax 1985	141	-0.1139	0.177
Rose / Pommier ; Yo-Yo Ma / Ax 1992	141	0.4831	< 0.001
Rose / Pommier ; Starker / Buchbinder	141	0.5248	< 0.001
Rose / Pommier ; Bylsma / Orkis	141	-0.295	< 0.001
Rose / Pommier ; A Bekova / E Bekova	141	-0.3521	< 0.001
Rose / Pommier ; Harrell / Kocacevich	141	0.3608	< 0.001
Rose / Pommier ; Schiff / Oppitz	141	0.3405	< 0.001
Rose / Pommier ; Maisky / Gililov	141	-0.0505	0.551

Rose / Pommier ; Bengtasson / Kavtaradze	141	0.5449	< 0.001
Rose / Pommier ; Isserlis / Hough	141	-0.1998	0.017
Rostropovich / Serkin ; Isserlis / Evans	141	-0.0469	0.579
Rostropovich / Serkin ; Yo-Yo Ma / Ax 1985	141	-0.1306	0.121
Rostropovich / Serkin ; Yo-Yo Ma / Ax 1992	141	-0.0675	0.425
Rostropovich / Serkin ; Starker / Buchbinder	141	-0.0062	0.941
Rostropovich / Serkin ; Bylsma / Orkis	141	-0.074	-0.074
Rostropovich / Serkin ; A Bekova / E Bekova	141	0.0116	0.891
Rostropovich / Serkin ; Harrell / Kocacevich	141	0.891	0.032
Rostropovich / Serkin ; Schiff / Oppitz	141	-0.0291	0.731
Rostropovich / Serkin ; Maisky / Gililov	141	-0.1088	0.197
Rostropovich / Serkin ; Bengtasson / Kavtaradze	141	-0.067	0.428
Rostropovich / Serkin ; Isserlis / Hough	141	0.0534	0.528
Isserlis / Evans ; Yo-Yo Ma / Ax 1985	141	-0.0265	0.754
Isserlis / Evans ; Yo-Yo Ma / Ax 1992	141	0.5236	< 0.001
Isserlis / Evans ; Starker / Buchbinder	141	0.5263	< 0.001
Isserlis / Evans ; Bylsma / Orkis	141	-0.4438	< 0.001
Isserlis / Evans ; A Bekova / E Bekova	141	-0.2234	0.008
Isserlis / Evans ; Harrell / Kocacevich	141	0.2863	< 0.001
Isserlis / Evans ; Schiff / Oppitz	141	0.1632	0.052
Isserlis / Evans ; Maisky / Gililov	141	-0.0338	0.69
Isserlis / Evans ; Bengtasson / Kavtaradze	141	0.558	< 0.001
Isserlis / Evans ; Isserlis / Hough	141	0.0534	0.528
Yo-Yo Ma / Ax 1985 ; Yo-Yo Ma / Ax 1992	141	0.1646	0.05
Yo-Yo Ma / Ax 1985 ; Starker / Buchbinder	141	0.0802	0.342
Yo-Yo Ma / Ax 1985 ; Bylsma / Orkis	141	-0.1053	0.212
Yo-Yo Ma / Ax 1985 ; A Bekova / E Bekova	141	0.2528	0.002
Yo-Yo Ma / Ax 1985 ; Harrell / Kocacevich	141	-0.0467	0.581
Yo-Yo Ma / Ax 1985 ; Schiff / Oppitz	141	-0.177	0.035
Yo-Yo Ma / Ax 1985 ; Maisky / Gililov	141	-0.2829	< 0.001
Yo-Yo Ma / Ax 1985 ; Bengtasson / Kavtaradze	141	-0.1415	0.093
Yo-Yo Ma / Ax 1985 ; Isserlis / Hough	141	-0.0569	0.501
Yo-Yo Ma / Ax 1992 ; Starker / Buchbinder	141	0.5139	< 0.001
Yo-Yo Ma / Ax 1992 ; Bylsma / Orkis	141	-0.2651	0.001
Yo-Yo Ma / Ax 1992 ; A Bekova / E Bekova	141	0.0193	0.82
Yo-Yo Ma / Ax 1992 ; Harrell / Kocacevich	141	0.2709	0.001
Yo-Yo Ma / Ax 1992 ; Schiff / Oppitz	141	0.2454	0.003
Yo-Yo Ma / Ax 1992 ; Maisky / Gililov	141	-0.1568	0.062
Yo-Yo Ma / Ax 1992 ; Bengtasson / Kavtaradze	141	0.4037	< 0.001
Yo-Yo Ma / Ax 1992 ; Isserlis / Hough	141	-0.2067	0.014
Starker / Buchbinder ; Bylsma / Orkis	141	-0.3932	< 0.001
Starker / Buchbinder ; A Bekova / E Bekova	141	-0.2037	0.015
Starker / Buchbinder ; Harrell / Kocacevich	141	0.2664	0.001
Starker / Buchbinder ; Schiff / Oppitz	141	0.4418	< 0.001

Starker / Buchbinder ; Maisky / Gililov	141	-0.1556	0.064
Starker / Buchbinder ; Bengtasson / Kavtaradze	141	0.4237	< 0.001
Starker / Buchbinder ; Isserlis / Hough	141	-0.1129	0.181
Bylsma / Orkis ; A Bekova / E Bekova	141	0.2619	0.002
Bylsma / Orkis ; Harrell / Kocacevich	141	-0.0495	0.558
Bylsma / Orkis ; Schiff / Oppitz	141	-0.2286	0.006
Bylsma / Orkis ; Maisky / Gililov	141	0.0729	0.389
Bylsma / Orkis ; Bengtasson / Kavtaradze	141	-0.2958	< 0.001
Bylsma / Orkis ; Isserlis / Hough	141	0.0092	0.913
A Bekova / E Bekova ; Harrell / Kocacevich	141	-0.3174	< 0.001
A Bekova / E Bekova ; Schiff / Oppitz	141	-0.2909	< 0.001
A Bekova / E Bekova ; Maisky / Gililov	141	-0.2621	0.002
A Bekova / E Bekova ; Bengtasson / Kavtaradze	141	-0.3337	< 0.001
A Bekova / E Bekova ; Isserlis / Hough	141	0.2231	0.008
Harrell / Kocacevich ; Schiff / Oppitz	141	0.2845	< 0.001
Harrell / Kocacevich ; Maisky / Gililov	141	0.1507	0.074
Harrell / Kocacevich ; Bengtasson / Kavtaradze	141	0.2462	0.003
Harrell / Kocacevich ; Isserlis / Hough	141	-0.4077	< 0.001
Schiff / Oppitz ; Maisky / Gililov	141	0.0007	0.994
Schiff / Oppitz ; Bengtasson / Kavtaradze	141	0.2509	0.003
Schiff / Oppitz ; Isserlis / Hough	141	-0.4753	< 0.001
Maisky / Gililov ; Bengtasson / Kavtaradze	141	0.1507	0.073
Maisky / Gililov ; Isserlis / Hough	141	-0.1722	0.04
Bengtasson / Kavtaradze ; Isserlis / Hough	141	-0.0681	0.421

In the F major sonata, Rose shows similarity in how expressive timing is shaped in his 1947 and 1984 (r = 0.6071; p < 0.001) renditions. His expressive timing in 1947 is also similar to Harrell's of 1980 (r = 0.5291; p < 0.001) and 1998 (r = 0.502; p < 0.001) and to Ma's of 1992 (r = 0.5363; p < 0.001). Amongst renditions by the Rose line, the only one which does not show similarity in expressive timing with Rose's 1947 rendition is Ma's from 1985. From the findings of expressive timing of Rose and his students, it can be suggested that in comparision with the e minor sonata renditions, more positive findings of similarity in expressive timing in the teacher-student relationships is found in the F major performance. In addition, the expressive timing of Rose (1947) also shows some similarities with that of Fournier, Rostropovich in 1957 (but not with Rostropovich's 1983 version), Tortelier's, Isserlis in 1984 (but not with Isserlis' 2000 rendition), Starker in 1995 (but not in 1957) and Schiff, Bengtasson.

The expressive timing of Minardi is similar to that of Tortelier (r = 0.5245; p < 0.001), of Isserlis in 1984 (r = 0.5178; p < 0.001) (but not with Isserlis in 2000) and Ma in 1992 (r =

0.6441; $p < 0.001$) (but not with Ma's 1985 rendition).

Fournier is similar to Tortelier ($r = 0.6091$; $p < 0.001$), Rose (1984) ($r = 0.6638$; $p < 0.001$), Isserlis (1981) ($r = 0.6053$; $p < 0.001$) (but not to Isserlis' 2000 version), Starker (1995) ($r = 0.5092$; $p < 0.001$) and Bengtasson ($r = 0.5125$; $p < 0.001$). Rostropovich (1957) is similar to Tortelier ($r = 0.5263$; $p < 0.001$), to Harrell's 1980 rendition ($r = 0.5335$; $p < 0.001$) (but not with his 1998 one), to Rose in 1984 ($r = 0.5138$; $p < 0.001$), to Isserlis in 1984 ($r = 0.5115$; $p < 0.001$) (but not with Isserlis' 2000 rendition), to Ma in 1992 ($r = 0.572$; $p < 0.001$) (but not with Ma's 1985 version) to Starker (1995) ($r = 0.6055$; $p < 0.001$), but not with Rostropovich (1983).

Starker/Sebok is similar to Starker (1995) ($r = 0.6742$; $p < 0.001$). Evidence suggests that Starker's style of expressive timing remains almost unchanged. Tortelier is similar to Harrell's 1980 version ($r = 0.584$; $p < 0.001$) (but not with Harrell's 1998 one), to Isserlis' 1984 rendition ($r = 0.5263$; $p < 0.001$) (but not with Isserlis' 2000 one), to Starker (1995) ($r = 0.6423$; $p < 0.001$) and to Bengtasson ($r = 0.5279$; $p < 0.001$).

Harrell (1980) is similar to Rose's 1984 version ($r = 0.5111$; $p < 0.001$). Isserlis' 1984 ($r = 0.5391$; $p < 0.001$ (but not with Isserlis' 2000), Bengtasson ($r = 0.5719$; $p < 0.001$). Rose (1984) is similar to Isserlis' 1984 rendition ($r = 0.606$; $p < 0.001$) (but not with his 2000 version), to Starker (1995) ($r = 0.5248$; $p < 0.001$) and to Bengtasson ($r = 0.5449$; $p < 0.001$).

Rostropovich (1983) is similar to Harrell (1998) ($r = 0.891$; $p < 0.001$). Isserlis (1984) is similar to Ma (1992) ($r = 0.5236$; $p < 0.001$) (but not with Ma in 1985) and to Starker (1995) ($r = 0.5263$; $p < 0.001$). Ma (1992) is similar to Starker (1995) ($r = 0.5139$; $p < 0.001$).

Data used in this study by no means represents the exclusive list of the repertoire. It can, however, be suggested that the twenty five selected recordings are enough material to represent the Brahms performance practice of the repertoire. In general, expressive timing in the case of multiple renditions by the same performers suggests that hardly any similarity was discovered between any given two performances. In other words, the styles of expressive timing tend to change in the course of duration time, whether this is as short as seven years (in Yo-Yo Ma's case) or as long as twenty. There is some evidence of pedagogical similarities in the same pedagogical lineage, such as the Rose line. Since style changes have been detected in the same performer, pedagogical similarities discovered in the Rose line are particularly interesting.

4.4. Expressive dynamics in relation to expressive timing

Moving on to expressive dynamics in relation to expressive timing, the selected twelve cellists are outlined below.

Table 4.7. Bar-level expressive timing and dynamics, Section B, Trio (N = 41)

Cellists	Year	r	p
Harrison	1927	-0.29	0.01
Feuermann	1930s	-0.23	0.14
Piatigorsky	1936	-0.44	0.003
du Pré	1968	-0.22	0.06
Rostropovich	1983	-0.09	0.42
Ma	1985	-0.07	0.51
Bylsma	1995	-0.35	0.003
Bekova	1996	-0.11	0.35
Harrell	1997	0.21	0.06
Schiff	1997	-0.41	0.0004
Maisky	1999	-0.06	0.58
Isserlis	2005	-0.17	0.15

Table 4.7 indicates the correlation at bar level between expressive timing and dynamics, which reads as a fair dissimilarity and means expressive timing and dynamics move independently from each other. Such instances can be found in phrase boundaries. In other words, the findings of performances of the Trio of the second movement in the E minor cello sonata contrast with Todd's (1992) hypothesis of motor action that expressive timing and dynamics in performance are related in the interpretative styles of the Romantic repertoire.

Table 4.8. Bar-level expressive timing and dynamics (N = 141)

Cellists	Year	r	p
Casals	1936	-0.28	0.008
Rose	1947	-0.38	0.0002
Piatigorsky	1966	-0.17	0.11
du Pré	1968	-0.32	0.001
Rostropovich	1983	-0.21	0.04
Ma	1985	-0.41	0.00008
Bylsma	1995	-0.29	0.004
Bekova	1996	-0.37	0.0003
Harrell	1997	-0.39	0.0001
Schiff	1997	-0.43	0.00003
Maisky	1999	-0.43	0.00003

Isserlis	2005	-0.28	0.008

As with the E minor Sonata renditions, a correlation rate between the bar-level expressive timing and dynamics of the second movement of the F major Sonata suggests fair dissimilarity in the ways in which two different musical expressions are integrated (see Table 4.8) in the context of performance practice on record. It can be suggested that dissimilar timing and loudness profiles do not mean that they are independent. It just means that the relationship between them varies from moment to moment according to the local musical situation(score and performance) and the performer's choices and expressive aims.

4.5. Portamento and vibrato

- **Portamento in performing Brahms**

Cello portamento never completely disappeared at any later point of the twentieth century. In other words, post-WW2 can be seen as the beginning point of a decline in cello portamento rather than its sudden disappearance. Although cellists on record also use portamento throughout the 1960s and 1990s, due to its selective use insufficient quantitative portamento data are available for conceptualising the individual portamento style of any cellist other than Casals (for further discussion, see Chapter 5).

Moving on to the portamenti in performing Brahms, the piece used for investigation is the first 19 bars of the Adagio affettuoso in Brahms' F major sonata for cello and piano op.99, section A of an ABA form movement. The initial 19 bars consist of 11-bar (4+4+3) and 8-bar (4+4) phrases in F# major and both phrases are in half cadences. The onset of the second beat of bar 19 defines the end of the excerpt. The selected excerpt contains 158 onsets. Six recordings were chosen for the investigation. It has been shown that in comparison to vibrato, which all the selected cellists apply as a regular mean of expression, portamento is rather rarely applied. Therefore, the main analytical point of portamento investigation considers whether it occurs and if so, how often.

Table 4.9. Portamento of the Brahms cello sonata in F, Adagio sostenuto, bars 1-19

Artists	date	age	occurrence
Casals	1936	60	5
Pleeth	1940	24	5
Rose	1947	29	5
Mainardi	1952	55	1
Fournier	1955	49	4
Rostropovich	1957	30	4
Starker / Sebők	1959	35	2
Piatigorsky	1966	63	1
du Pre	1968	23	2
Tortelier	1978	64	4
Harrell	1980	36	2
Shafran	1980	57	1
Rose	1983	65	5
Rostropovich	1983	56	2
Isserlis	1984	26	0
Ma	1985	30	0
Ma	1992	37	1
Starker / Buc	1994	70	1
Bylsma	1995	61	0
Bekova	1996	33	0
Harrell	1997	53	0
Schiff	1997	46	0
Maisky	1999	51	1
Bengtasson	1999	67	0
Isserils	2005	47	0

Table 4.9 shows the date of recordings, the age of the artists at the time and the occurrence of portamento within the selected excerpt. According to the data in Table 4.8., portamento tends to occur more frequently in early-recorded performances, although it is unclear whether there is any relevant relation between portamento occurrence and the age of artists. By analysing data through correlation, one can recognise more clearly how the date the recordings and age of the artist at the time may relate to the occurrence rate of portamento.

Data suggest no meaningful correlation between the occurrence of portamento and the age of the artist at the time of recording. With regard to the date of recording in relation to portamento occurrence, findings indicate that the earlier the recording, the more occurrence of portamento.

Table 4.10. Portamento occurrence in relation to date of recording and the age of the artists

x; y	*r*	*p*
date; occurrence	-0.752	< 0.001
age; occurrence	-0.0765	0.716

Portamento style was also considered for artists whose performance of the selected excerpt involves more than three occurrences of portamento. Styles were analysed as to whether pitch leaps are correlated to slide duration. Pitch leaps were converted into numbers; augmented as 4, major or perfect as 3, minor as 2, diminished as 1 and ascending as plus and descending as minus.

It appears that the selected cellists tend to 'glide' more frequently on descending pitch leaps than ascending ones. Amongst cellists who recorded multiple renditions of the repertoire, Rose and Rostropovich are the only ones whose occurrence rate of portamento could be considered to be meaningful enough for further analysis. In the interval of 37 years between the two recordings, there is little difference in Rose's portamento occurrence. Whilst Rostropovich applied meaningful instances of portamento in 1957, it was rarely applied in his 1983 recording.

Whilst Casals' glide duration is relatively longer than that of any of the other selected cellists, his portamento does not show any relation between the interval of pitch leap and the length of slide duration. Pleeth's, Rose's and Fournier's glide duration tend to be longer in descending pitch leaps.

Table 4.11. Portamento in Brahms' Sonata in F major, Adagio affettuoso, bars 1-19

Cellists	Date	Pitch leaps	Places	Duration	*r*	*p*
Casals	1936	asc M2	b5/3-3.75	150	0.2495	0.686
		desc M2	b9/2-2.5	140		
		asc P5	b9/4-4.5	210		
		desc M6	b13/1.6-2	174		
		desc M3	b15/1-1.5	220		
Pleeth	1940	asc M2	b5/3-3.75	117	0.5513	0.335
		desc M2	b12/2-2.3	95		
		desc M2	b12/4-4.3	104		
		desc P5	b13/4-4.5	142		
		desc P5	b17/4-4.3	134		
Rose	1947	asc M2	b5/3-4.5	126	0.8639	0.059
		desc M2	b10/3-4	104		
		desc M2	b12/2-2.3	94		
		desc M2	b12/4-4.3	102		
		desc M6	b13/1.6-2	138		
Fournier	1955	desc M2	b10/3-4	127	0.7706	0.229
		desc m2	b11/1-2	118		
		desc M3	b15/1-1.5	105		
		asc P4	b15/3.5-4	144		
Rostropovich	1957	asc M2	b5/3-3.75	95	-0.256	0.744
		desc A2	b6/4-4.5	132		
		desc M3	b15/1-1.5	175		
		asc P4	b16/4.5-b17/1	148		
Tortelier	1978	desc M2	b10/3-4	94	0.4891	0.511
		desc P5	b13/4-4.5	136		
		asc M3	b14/4-4.5	124		
		desc P5	b17/3.5-4	142		
Rose	1983	asc M2	b5/3-3.75	124	0.662	0.224
		desc M2	b9/2-2.5	98		
		desc M2	b10/4-b11/1	106		
		desc M6	b13/1.6-2	178		
		asc P4	b16/4.5-b17/1	156		

It can be suggested that common places are chosen for glides. Casals uses the slowest slides, in the range of 140-220 ms, and the standard deviation of his glide duration is also long than that of others.

Portamento occurrences in the Brahms cello sonata renditions tend to cause synchronisation errors between ensembles. In ensemble performance, a portamento may

make it difficult for pianists to synchronise, because glide is a performer-oriented (not prescribed or notated in score) vocal quality expression in phrasing. One reason for rare portamento occurrences in the Brahms cello sonata could be that cellists tend to glide where ensemble synchronisation errors are unlikely to occur. Such places include the piano playing long chords or rests, which can be found in the third beat of bar 5, the second and third beats of bar 9 and first beat of bar 13. In the case of ensemble synchronisation error occurrence, variances appear minimal.

Table 4.12. Portamento in relation to recording dates and the age of artists

x; y	*r*	*p*
Recording Dates; Glide Occurrences	-0.8	0.02
Recording Dates; Slide Speed	-0.45	0.1
Age of Artists; Glide Occurrences	0.37	0.2
Age of Artists; Slide Speed	0.45	0.1

A correlation between performances of cello portamenti on record was observed in relation to recording date, the age of artists at the time of recordings, pedagogical lineages between artists and the style of the specific piece being performed. The findings suggest that in performing Brahms, more portamento occurrences are found in some cellists, as they grow older and slide speed becomes slower. In parallel, as the recording dates become later, fewer portamento occurrences are found and slide speed becomes faster. It appears that recording date and the age of artists at the time of recording appear to be influenced by the history of portamenti in cello playing.

- **Vibrato**

The two general assumptions in the history of string playing concern vibrato and portamento. That is, whilst vibrato is considered to have been played continuously from the post-WW2 era, portamento has declined in the same period. Contrary to the general assumption that vibrato has been applied continuously to string playing in the post-WW2 period, all my selected cellists apply vibrato selectively.

Table 4.13. Vibrato speed and depth of the E minor sonata, 2nd movement

Artists	Date	speed (cps)	depth (cents)
Harrison	1927	4.8	46
Feuermann	1934	5	48
Piatigorsky	1936	5.6	44
Gendron	1952	5.7	50
Starker / Bo	1954	6	52
Fournier	1955	5.3	47
Rostropovich	1957	5.2	55
Starker / Seb	1959	5.4	55
du Pré	1968	5.6	57
Tortelier	1978	6.2	56
Harrell	1980	6.3	48
Shafran	1980	5.8	46
Rose	1983	5.4	42
Rostropovich	1983	5.5	58
Isserlis	1984	5.4	50
Ma	1985	6	52
Ma	1992	5.8	50
Starker	1994	5.7	54
Bylsma	1995	5.5	45
Bekova	1996	6	57
Harrell	1997	5.4	50
Schiff	1997	5.5	52
Maisky	1999	5.5	54
Bengtasson	1999	5.7	62
Isserlis	2005	5.8	55

Table 4.14. Correlation of vibrato in the E minor sonata

op.38	*N*	*r*	*p*
speed ; depth	25	0.2718	0.189
date ; speed	25	0.4508	0.024
date ; depth	25	0.37	0.069
age; speed	25	0.0862	0.682
age; depth	25	0.0426	0.84

Performing the E minor cello sonata, findings suggest that the speed of vibrato has some relation to the date of recordings; that is, the later the recording, the faster the vibrato. However, vibrato speed and depth themselves do not show any meaningful correlation between each another.

Table 4.15. Vibrato speed and depth of the F major sonata, 2nd movement

Artists	Date	speed (cps)	depth (cents)
Casals	1936	5.8	45
Pleeth	1940	5.1	50
Rose	1947	5.3	64
Mainardi	1952	5.9	50
Fournier	1955	5.4	45
Rostropovich	1957	5.1	50
Starker	1959	5.3	57
Piatigorsky	1966	5.7	46
du Pré	1968	5.8	55
Tortelier	1978	6.4	52
Harrell	1980	6.2	44
Shafran	1980	5.6	42
Rose	1983	5.2	40
Rostropovich	1983	5.3	50
Isserlis	1984	5.7	48
Ma	1985	5.9	44
Ma	1992	6	52
Starker	1994	6.1	52
Bylsma	1995	5.4	41
Bekova	1996	6.2	54
Harrell	1997	5.2	46
Schiff	1997	5.3	45
Maisky	1999	5.3	56
Bengtasson	1999	6	67
Isserlis	2005	5.7	56

Table 4.16. Correlation of vibrato in the F major sonata

op.99	N	r	p
speed ; depth	25	0.1446	0.491
date ; speed	25	0.2316	0.265
date ; depth	25	0.0237	0.91
age; speed	25	0.1552	0.459
age; depth	25	-0.1729	0.408

Whilst portamento analysis suggests some meaningful findings between cellists' age and portamento occurrences and/or slide speed and the vibrato of the E minor cello sonata in relation to the speed of vibrato and the date of recordings, vibrato does not show any meaningful correlation to any of the aspects that have been examined in the case of the F major sonata.

4. 6. Musical expression in recordings of the Brahms cello sonatas

Data used in this study by no means represent the exclusive list of the repertoire. It can, however, be suggested that the twenty five selected recordings are sufficient material to represent the Brahms performance practice of the repertoire. Performance trends in the Brahms cello sonatas can be suggested to relate to five different aspects. The performance trends in the relative duration of the sonatas are related to historical aspects such as the date of recording for the E minor sonata, whereas the relative duration of the F major is related to the structure of the music. Expressive timing in the case of multiple renditions by the same performers suggests that almost no similarity was discovered between any given two performances. In other words, the styles of expressive timing tend to change over time, whether this is as short as seven years (Yo-Yo Ma) or as long as twenty. There is some evidence of pedagogical similarities in the same pedagogical lineage, such as the Rose line. Since style changes have been detected for the same performer, pedagogical similarities discovered in the Rose line in the F major sonata case study appear particularly interesting. However, since correlation is not necessarily an indication of influence, it is certainly possible that similar features of musical expression handling might derive from independent decisions based in the nature of the score by individual performers, rather than deriving from the influence of teacher-pupil relationships. It can be suggested that dissimilar timing and loudness profiles do not mean that they are independent. It simply means that the relationship between them varies from moment to moment according to the local musical (score and performance) situation and the performer's choices and expressive aims. Whilst portamento analysis suggests some meaningful findings between cellists' age and portamento occurrences and/or slide speed and the vibrato of the E minor cello sonata in relation to the speed of vibrato and the date of recordings, vibrato does not show any meaningful correlation with any of the aspects examined in the case of F major sonata.

By computing the handling of musical expression on record, this study has showcased how the application of statistical methods helps us to be certain about our assumptions about performance trends on record, such as whether pedagogical influence, the time of recording, and the age of the artists might have played roles in the handling of musical expression on record.

Amongst the investigated pedagogical groups of cello playing, including the Klengel and Becker lineages, the Rose line and pupils of Casals, Rostropovich, Navarra and du Pré, some pedagogical influences have been identified in the Rose line and amongst pupils of du Pré and Navarra. Inconclusive findings of pedagogical influence might be related to the

blurring of pedagogical relationships of twentieth-century cello playing; it can also be concluded that artists create their own virtuosi style based on blended pedagogical influences. The investigated cellists linked with Casals pedagogically in one way or another show no similarity in handling musical expression to Casals, whereas Rostropovich's performance style shows much similarity with the investigated cellists that made recordings in the 1990s, regardless of pedagogical links. The following two chapters will focus on the artistic innovations of the two cellists in question, and aim to establish what aspects of Casals' art of cello playing would have attracted the younger generation of cellists to have direct or indirect pedagogical relationships with him, and what kind of stylistic features of Rostropovich's musical expression on record would have influenced them.

Chapter 5

Performance Aesthetics of Casals' Bach

This chapter aims to discover the artistic style of the cellist Pablo Casals. Expressive timing, dynamics shaping, vibrato and portamento in Casals' 1936 recording of the selected three movements from J.S.Bach's solo cello suite BWV1007 are empirically analysed, often in relation to the cellist's performance aesthetics expressed in published interviews about musical expression and/or his unreleased footage of 1954.

5.1. Casals' performance philosophy and Bach

This chapter discusses the art of cello playing of Pablo Casals, focusing on his ideas about the handling of musical expression in performance, and empirically investigates how his performance aesthetics conform to his actual performances of Bach on record. Throughout his musical career, Casals achieved recognition for his cello playing. His interpretation of the Bach suites proved to be a milestone in the history of cello playing; it has been claimed that "Bach's Solo Cello Suites, works [Casals] had done more than anyone to popularise" (Greenfield 2011: 67). That is to say, in the very early 20th century, an entire Bach Suite was considered to be like "an exercise, without real musical meaning" (Blum 1977: 141). The reputation of J.S.Bach's solo suites in the concert repertoire in particular was established after Casals included the piece in his recital repertoire. When Casals' romantic (Blum 1977) interpretation of Bach was introduced for the first time, he received contradictory reviews: whilst some said it was not Bach, others said it was a real discovery (Blum 1977). Casals' performances have received a mixed reception both in his time and in recent years; some perceive them as a unique rendition, whilst others consider them as eccentric and unconventional interpretations. The uniqueness and peculiarity of Casals' performance styles require empirical scholarly attention. Since published interviews, where available and appropriate, could serve as an alternative to the ethnographic approach to discovering a performer's thoughts, I consider the interrelationship between Casals' performance aesthetics and styles, focusing on expressive timing, dynamics, vibrato and portamento.

Many interviews with the cellist were conducted in his later years. Amongst many writings about interviews with Casals, the selected remarks published in David Blum's (1977) study *CASALS and the Art of Interpretation* and José Maria Corredor's book *Conversations with Casals*, were taken into account in the empirical investigation concerning the handling of musical expression, particularly in relation to performing Bach. Given Blum's experience as a pupil of Casals, his conversations with the cellist, in particular, seem to provide a useful source. Casals' thoughts about musical expression, such as expressive timing, dynamics, vibrato and portamento, seem worthy of note, because he also talks about the relationships of one musical expression to another in addition to their interpretative relevance.

- **Selected recordings for the investigation**

My previous research (2003) on Casals' two renditions of J.S.Bach's C major Sarabande BWV1009 discovered that his performance styles of 1915 and 1936 remain generally

unchanged and also conform to his own performance suggestions. This chapter investigates the artistic style of the cellist performing a different cello suite; three selected movements from J.S.Bach's Cello Suite in G major BWV1007.

From the early-recorded era up until the 1950s, the focuses of record reviews of Bach cello suites remained on Casals' 1930s sets of HMV recordings. By 1940, Casals refused to perform in the West due to the conflict between the West's diplomatic action and his political beliefs about the Franco government. With the availability of his footage of performing J.S.Bach in 1954, this empirical investigation compares his performance styles and/or interpretative insights between the 1936 recording and 1954 footage of the same repertoire. Four different aspects of musical expression, expressive timing, expressive dynamics, vibrato and portamento, were considered.

5.2. Casals' expressive timing

A comparative analysis of Casals' expressive timing is investigated, focusing on the overall tempo (in relation to other renditions), the bar or beat level rubato of the selected three movements and also the rhythmic patterns at inter-onset interval.

- **Overall tempo of the three selected movements**

Casals suggests that "the 'authentic' tempo is impossible" (Corredo 1956: 123). The tempo should vary with the performer according to the circumstances. Or to put it another way, he anticipates that using a mechanical pulse is not how music should be played. The most significant matter here is that the performer should know how to produce the tempo that suits his personal feeling towards the spirit of the music. Casals considered that although each dance reflects the ambience of the opening movement, the character of entire suites is decided upon in the opening Prelude movement. He perceives a crucial mood of the first suite G major as "optimism" (Blum 1977: 141). In order to illustrate how conventional or otherwise Casals' tempo is in relation to other renditions, the overall tempo (see Table 5.2) of six other renditions are also considered.

Table 5.1. Overall tempo of Casals

Cellists	**Year**		crotchet beats per minute	Prelude	Sarabande	Menuet
Casals	1936	[1997]		69	55	145
Casals	1954			77	53	152

Blum finds that Casals' Prelude of Bach's first cello suite is "unique in its fullness of expression, its ability to let the phrases breathe" (1977: 146). He considers that Casals' expressiveness derives from taking a slower tempo than other cellists that Blum had also heard in the same BBC programme. Blum, however, did not provide any further information on the other recordings that were played together with those of Casals.

As Table 5.1 indicates, Casals' overall tempi of the Prelude are slightly faster in the 1954 footage (77 bpm in comparison to 67 bpm in 1936). In both performances, his Prelude sets up the overall mood of the suite and the beat level rubato reveals how his long resonated opening in the Prelude builds up phrasings, which suits the optimistic insight of the G major suite BWV1007. In the case of the Sarabande, his overall tempo is almost identical, at 53 and

55 bpm. In the Menuet renditions, the overall tempo of the 1954 footage (152 bpm) is faster than the 1936 recording (145 bpm). Given that overall tempo does not indicate a detailed level of the shape of musical expression, the study moves on to investigate how Casals handles expressive timing (bar or beat level rubato and note onset level rhythmic pattern).

- **Casals on rubato**

Casals' beat level rubato in the Prelude of BWV1007

I begin an empirical investigation of how Casals expresses his perception of 'optimism' through bar level rubato. In section A, Casals' long resonated rubato in the opening G2 of the Prelude creates the sense of establishing an optimistic G major triad. His semiquavers in the opening are not evenly spaced. He places a ritardando in the G major phrase boundary in bar 4, hinting at the beginning of a new phrase. His unevenly spaced semiquaver rhythms continue in the D major phrase of another four-bar grouping, but the phrase boundary in bar 8 is not emphasised with slowing down. In bars 9 and 10, his rhythmic swing becomes more noticeable: that is, followed by evenly spaced ascending melodies in the 1st and 3rd beats, the beginning pitches of descending scales in the 2nd and 4th beats are played with rubato and slowing down. Bars 11 to 14 are structured as a kind of query and response in E in bars 11-13 and in G in bar 14: Casals' rubato in the query (in bars 11 and 13 respectively) is found in the 1st and 3rd beats. The patterns of his responses with rubato vary: he highlights with rubato on the beginning pitches of descending scales; that is, the 2nd and 4th beats in the E major motive of bar 12, whereas his responsive rubato in G is found in the 1st and 3rd beats of bar 14. A five bar phrase of bars 15-19 in the returning to G is marked with rubato at the beginning of the phrase and phrase boundary. The C#2 in bar 20 is highlighted with rubato and the phrase ends with ritardando in the second beat of bar 22.

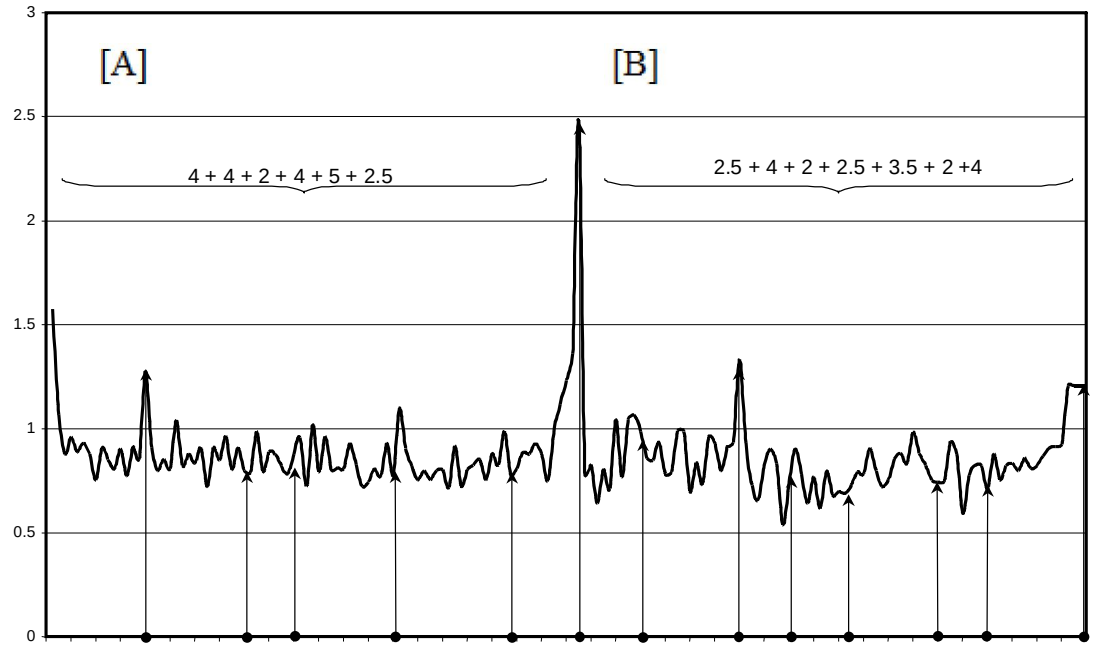


Figure 5.1. Beat level rubato of the Prelude performance

Section B is largely written in a melodic progression mixture of whole tone and chromatic scale passages, with a little focus on the tonal center. Rubato in section B appears to be related to melodic progression. A sense of forward direction is perceived in the ascending scale passages of the remaining bars 22 and 23, where the motive is responded to by using rubato in the beginning pitches of the descending motive in each beat of bar 24. He places rubato in the beginning of the ascending arpeggio in D in bar 25, G in bar 26 and in A in bar 27. His reactive rubato is followed in the descending arpeggio in G in bar 25 and in D in bar 28 and following ritardando at the phrase boundary. He also places rubato in the beginning pitches of the four semiquaver groups in bars 26 and 27, which draws largely descending chromatic motives. Another sense of forward direction is perceived in the descending scale passages in bars 29 and 30. Rubato is not noticeable in the following three phrases of grouping of 2.5 + 3.5 + 2, written with the split third. In the final phrase, he places rubato on the 1st and 3rd beats of bars 39, 40 and 41, which eventually leads to ritardando in bar 41 towards bar 42.

The long resonated opening G in the Prelude and his handling of rhythms, particularly reaching a climax and building up phrasings, have certainly provided an optimistic insight into the movement. His handling of bar level rubato in the Prelude indicates to the listener a sense of forward and backward direction and his application of rubato in combination with vibrato in the grouping of semiquavers also works effectively in the overall structure by

providing a flowing musical pulse.

Casals' shape of beat level rubato in the Prelude between the 1936 and 1954 performances remains similar (N = 162, r = 0.885, p < 0.001). It is true that Casals' suggestion of 'optimism' brings us back to the question of how metaphor relates to sound. It can be argued that 'long resonated rubato' may not signal 'optimism', but it could be perceived as optimism.

Casals on the Sarabande

Moving on to his rendition of the Sarabande, Casals believed that Bach conveys the full range of musical expression through the medium of dance. He comments that well-marked natural rhythmic accents could deliver the literal dance character of these movements effectively, while he expects that the performance of a Sarabande should be indicated with three steady crotchets in a bar, because it is considered as a "meditative" dance. But given that the natural rhythmic accents of the Sarabande are the second beat, analysing the proportional relationship between three beats in Casals' rendition would be a fruitful aspect of investigation.

Casals points out that chords in the Sarabande of the Bach suites should be played flowingly and singingly – with a resonance similar to that of a strummed lute. Yet they must never impede the rhythmic continuity (1977: 123). With the lute being a plucked instrument, his comments on expecting a strummed lute-like resonance in the Sarabande chords can be interpreted as playing an arpeggio-like broken chord.

Casals' crotchet beat level rubato of the Sarabande of BWV1007

At this point, Casals' handling of three beats in the repeat performance structure of the Sarabande is considered. By studying repeat performance structure, one can reveal whether or not performers' expressive gestures might be unintended chances or otherwise meaningfully selected ones. Figure 5.2 illustrates the beat level analysis of Casals' Sarabande performance.

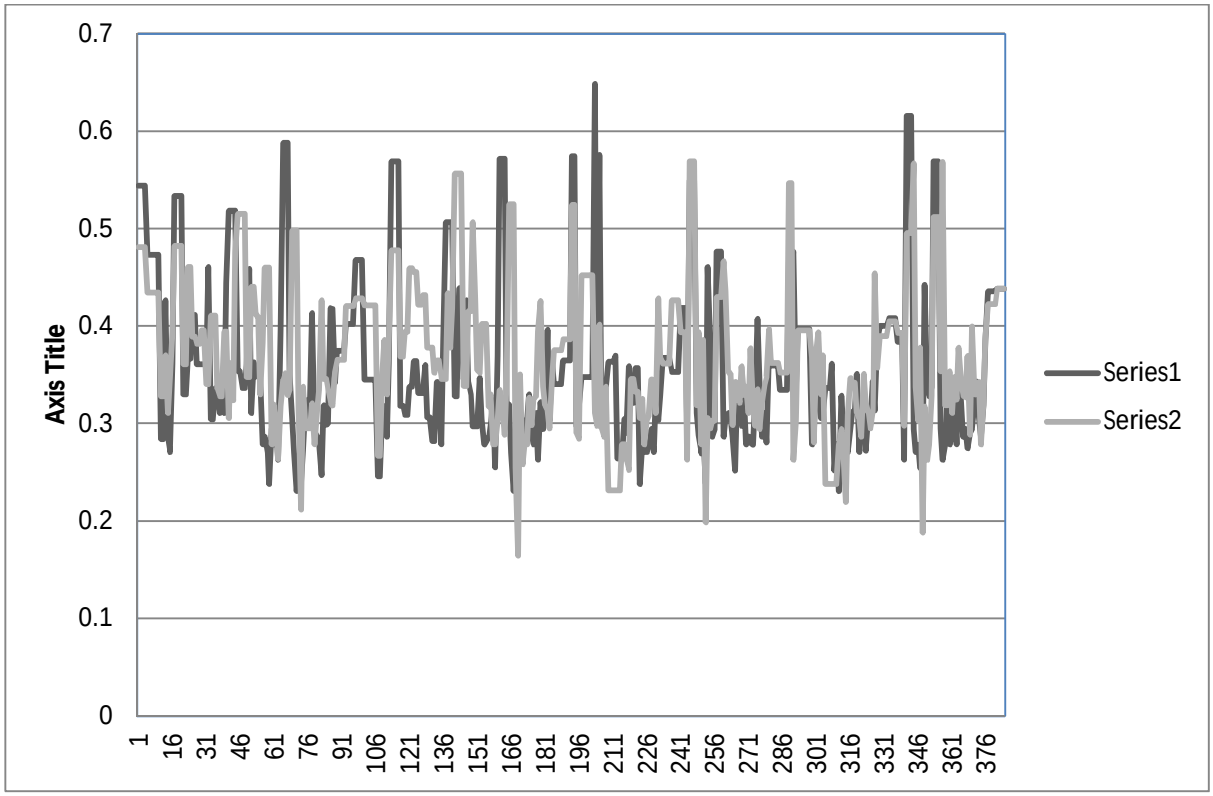


Figure 5.2. Crotchet beat level rubato of Casals' Sarabande performance

The x-axis is plotted in seconds. The graph therefore indicates that the slower the duration, the higher the column (and vice-versa). As can be seen in Figure 5.2, the second beat is often lengthened. The first beat, however, is emphasised more than the second beat in the opening of the Sarabande and in bar 3.

Casals' resonated execution of the opening G major tonic chord provides a sense that the movement opens with a grand gesture. Casals' phrasing direction then moves from the IV_6 in the second beat of bar 1 in a forward direction to the tonic in the second beat of bar 2. His four semi-quavers in the first beat of bar 2 can often be perceived as providing forward movement towards the second beat. The ways in which Casals executes the first four semi quavers in bar 2 shall be discussed in detail later. The returning tonic chord is also executed in a grand sense both in volume and length, which follows rubato on the D4 in bar 3. The returning dominant chord (followed by the sub-mediant and sub-dominant) on the second beat of bar 4 is highlighted with rubato: the way in which the trilled chord is executed attracts attention. That is, whilst the note itself is played with rubato, low register bass chords are executed insignificantly both in volume and length, allowing the trilled F#3 to be emphasised more efficiently. Here, assuming from the ways in which the bass chord in low registers and the trilled notes are executed, it can be suggested that Casals appears to consider the trill as a

more significant aspect of rendition than the returning dominant. He considers the first beat of bar 5 to be longer than the second beat, placing rubato on the A4, which is the highest pitch of the motive. On the whole, a steady pulse of three crotchets in a bar is indicated throughout the movement, with more weight on the second beat.

Returning to Casals' remarks about resembling a strummed lute in playing broken chords, he plays multiple stops, usually on the first and second beats of the Sarabande, in a similar fashion throughout. In the manner of a broken chord, the two bass notes of the triple stop are immediately followed by the top note. The final resonance of the broken chord of the triple stop becomes the continuity of the melodic line in a leisurely tempo. His tempo becomes rushed in the repeat, particularly the opening section, and the sub-dominant chord in bar 1 (the second beat) is subsequently played together rather than as a leisurely broken chord. But his handling of other triple stopping remains as a broken chord throughout the repeat structure; the second chord in the repeat could be suggested to be an artistic slip. He plays two bass notes immediately followed by another two in a quadruple stop. A double stop is played together swiftly, which provides the continuity of the melodic line for the listener.

Correlation of rubato in the Sarabande repeat structure

Having studied how Casals shapes crotchet beat level rubato in the repeat structure, I consider the correlation between Casals' rubato in the first-time round and in repeat. Figure 5.3 shows a scatter plot of Casals' rubato: *x* the first time, *y* the repeat.

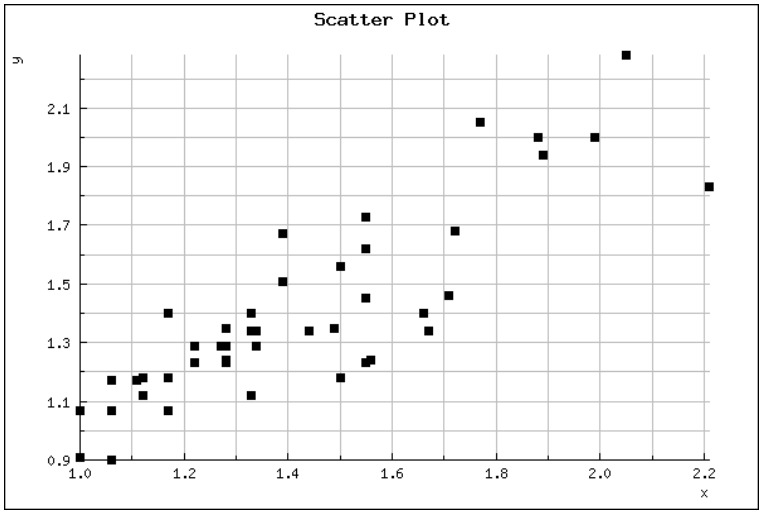


Figure 5.3. Casals' beat level rubato: *x* =first time; *y* = repeat

The beat level rubato between Casals' first time execution and repeat provides a strong positive correlation that $r = 0.84$ ($p < 0.001$), which shows a statistically significant correlation between the two. In other words, Casals' expressive timings in the repeat structure of the Sarabande are fairly similar to each other.

A constant pulse of three crotchets in a bar is indicated throughout the movement, with Casals playing the second beat more significantly in length than any other beats. In other words, Casals plays the repeat in much the same way as the statement. Casals' beat level rubato in the Sarabande between the first time and repeat is confirmed by a positive correlation of $r = 0.84$ ($p < 0.001$). Casals' handling of multiple stops is similar throughout: he plays double stops as one chord, but he shapes triple and quadruple stops in the manner of a broken chord, such as two bass stops, followed by one or two, followed by two respectively. Conforming to his performance aesthetics of the Sarabande, a strummed lute resonance is created in the handling of triple and quadruple stops in the manner of a broken chord. His handling of double stops also establishes the continuity of melodic and rhythmic lines.

Correlation ($N = 384$, $r = 0.4289$, $p < 0.001$) of note onset level rubato can suggest that the two variables from the Sarabande (1936 and 1954 respectively) are not as strongly correlated to one another as the two variables from the Prelude.

Casals' bar level rubato of the Menuet of BWV1007

Before considering Casals' expressive timing of the Menuet, the melodic, grouping and phrase structures are considered. Bach's writing is characterized by Casals' term "melodic arch" throughout of the Menuet using arpeggio. The ascending G major arpeggio creates one arch in bars 1-4, and the supertonic is followed by a descending dominant arpeggio one in bar 8, which resolves to a half cadence. The dominant of the G major ascending arpeggio creates another arch in bars 9-15, which resolves to a sub-mediant in bar 16, and Menuet I closes with the G major dominant and tonic arpeggios in an authentic cadence. Likewise, Menuet II also consists of a melodic arch using arpeggios. The D minor descending arpeggio opens the movement with an arch, followed by its sub-dominant and the tonic in bar 8, which ends in a plagal cadence. Arches deriving from the D minor tonic and leading-tone arpeggios dominate in bars 9-16. The D minor tonic and dominant arpeggios in bars 17-21 resolve to the G major arpeggio, leading to the Menuet I da Capo in an authentic cadence. The grouping structure consists of (4 + 4) (4 + 4 + 4 + 4) of the Menuet I + (4 + 4) (8 + 8) of the Menuet II + (4 + 4) (4 + 4 + 4 + 4) of the Menuet I da Capo.

When performing Menuet II, the Eb4 in bar 9, the D4 in bar 11, the Ab3 in bar 17 and the G3 in bar 19 are slightly stressed with a slow swing-like rubato, although there is a sense of steady pulse. Figure 5.4 shows the timing fluctuation graph of Casals: the black line illustrates Casals' timing fluctuations and the "*R*" indicates repeated execution.

Phrase boundaries are shaped with gradual slowing down, the G major triad in bar 4 and a descending dominant arpeggio one in bar 8. A super tonic of the G major descending arpeggio in bar 12 and a sub-mediant in bar 16 make the authentic cadence with the G major dominant and tonic arpeggios in the closing of Menuet I, which are articulated with another slowing down. Likewise, phrase boundaries in Menuet II are all marked with slowing down. For instance, the tempo becomes slow towards a plagal cadence in bar 8 of Menuet II, another half cadence in bars 15-16 (vii-I) and the G major authentic cadence in the ending. More exaggeration of slowing down in the phrase boundary is often found when repeated, rather than the first time round.

Correlation of rubato in the Menuet repeat structure

Table 5.2. Menuet repeat structure

		N	*r*	*p*
1936	M1: 1st; rpt	144	0.8049	< 0.001
	M2: 1st; rpt	144	0.8046	< 0.001
	daCapo: 1st; daCapo	144	0.7382	< 0.001
	daCapo: rpt; daCapo	144	0.8032	< 0.001
1954	M1: 1st; rpt	144	0.7056	< 0.001
	M2: 1st; rpt	144	0.8162	< 0.001
	daCapo: 1st; daCapo	144	0.1277	0.127
	daCapo: rpt; daCapo	144	0.1962	0.018

The correlation of expressive timing in the Menuet da Capo structure is considered at this point. Timing fluctuation in 1936 between Casals' first time execution and repeat provides a strong positive correlation that $r = 0.80493$ ($p < 0.001$), and the da Capo correlates to the first time execution $r = 0.7382$ ($p < 0.001$). In 1954, Casals' first time execution and repeat provides a strong positive correlation that $r = 0.7056$ ($p < 0.001$), but the da Capo correlates to the first time execution $r = 0.1277$ ($p < 0.127$).

Correlation of note onset level rubato between the two variables between the 1936 and 1954 performances is closer to uncorrelated ($N = 724$, $r = 0.2143$, $p < 0.001$). Expressive frequency of note onset level rubato is slightly more extensive in the 1936 in the Sarabande and in the 1954 in the Menuet.

- **Casals' rhythmic patterns**

In contrast to Casals' comment about the significance of underlying rhythmic continuity and constancy, the earlier discussion of bar-level rubato reveals that some occurrences of unevenness in rhythmic playing were seen occasionally. At this point, Casals' rhythmic patterns are considered at the inter-onset-interval (IOI).

Casals' rhythmic patterns of the Sarabande of BWV1007

Demi-semi quavers, the following four semi quavers in bar 6 and the first four semi quavers in bar 7 provide a sense of forward direction towards the D4 in bar 7, which marks the

dominant. The ways in which Casals executes the semi quavers in bars 6 and 7 will be discussed in detail later. In bar 8, he places longer rubato on the second beat, regardless of the phrase boundary. Often, the third beat is highlighted more than the first and second beats, such as phrase boundaries, in bar 12. He also places rubato on the third beat in bar 15, which prepares listeners for the ending of the movement.

Sets of semi quavers are used in the Sarabande writing, but two patterns represent rhythmic executions in Casals' performance (see Figure 5.4).

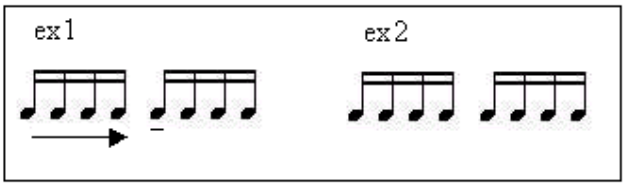


Figure 5.4. Rhythmic pattern examples

Casals' execution of sets of semiquavers becomes faster up to the point of his intended highlighted place, which is usually the start of the new set of four-semiquaver-groups. His hurrying rubato usually appears together with crescendo, which provides an example of Todd's motor action. This rhythmic irregularity pattern occurs on the first and second beats of bar 2, from the third beat of bar 6 to the first beat of bar 7 and from the third beat of bar 13 to the first beat of bar 14.

Figure 5.5 illustrates Casals' pattern of hurrying rubato in bars 1, 6 and 13: the green bars indicate the first time execution and the grey the repeat.

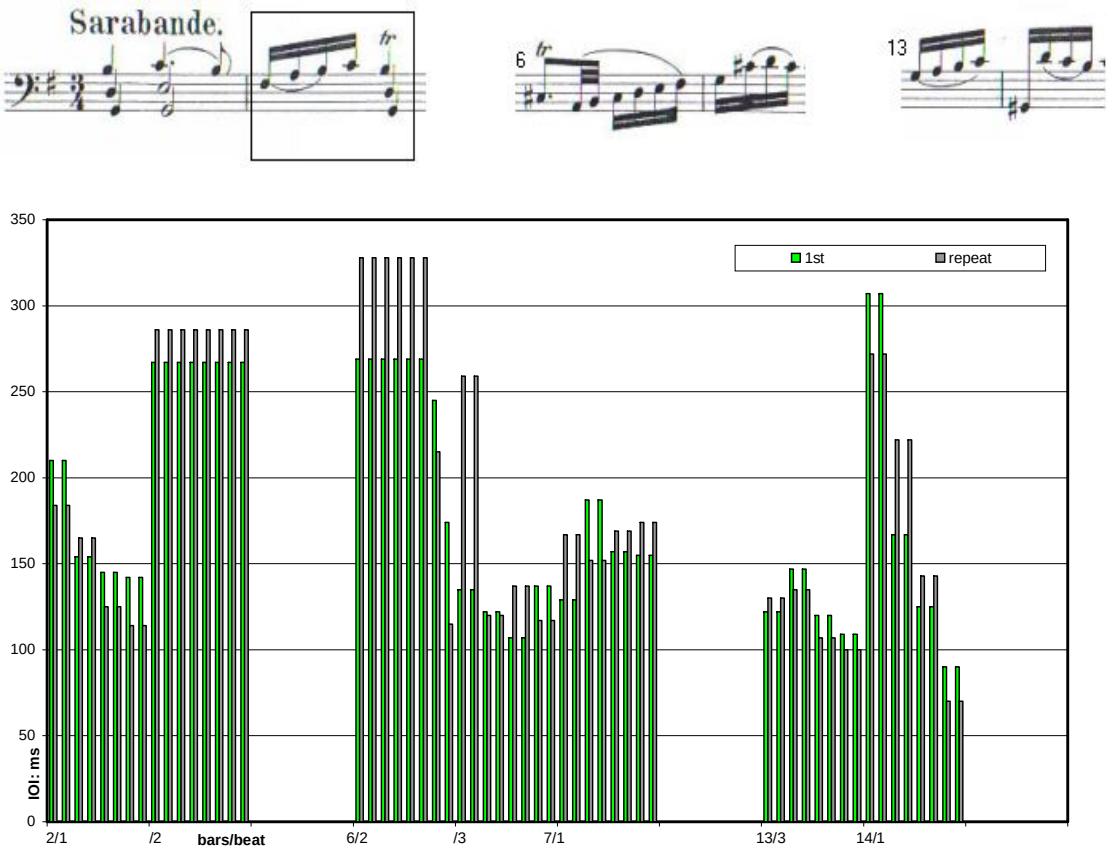


Figure 5.5. Casals' execution of the rhythmic patterns of the Sarabande

Overall, the melodic line freedom of musical expression was always present within the underlying rhythmic continuity of the Sarabande. That is, when executing accelerando, weakening of the rhythmic constancy was avoided at all times, whereas hurrying rubato usually appears with crescendo.

Casals' rhythmic variations of the Menuet of BWV1007

Moving on to rhythmic tendencies in the Menuet performance, the repeat performance structure of the first eight bar performance of Menuet I and bars 9-24 of Menuet II were investigated at note onset level. The excerpts were chosen as representative materials from an earlier investigation of bar level rubato.

The opening rhythmic pattern  appears throughout the first Menuet. The notes which become emphasised with rubato in the first eight bars of the Menuet I are different in the repeat performance structure; that is, the G2 in bar 1 with slow rubato the first time round and in the da Capo, whilst A3 in bar 3 is stressed with slow rubato in the repeat

and da Capo.

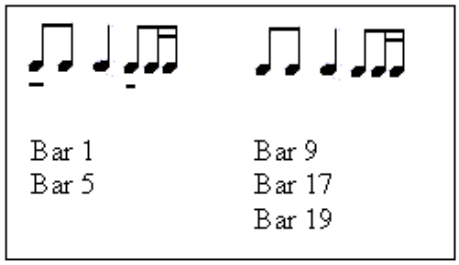


Figure 5.6. Rhythmic motive and Casals' rubato execution of the Menuet I

A similar style of rubato emphasis can be heard in the dominant 7th of G major in bar 5: the A2 in bar 5 is lengthened the first time round and in the da Capo, whilst Casals places slow rubato on the B3 in bar 5 all the time. Both bars 1 and 5 are characterised by Casals' performance style, which lengthens both the first and third beats of the rhythmic motive  . At this point, it can be presumed that rhythmic motives in both bars 1 and 5 are emphasised with rubato on the first beat on the group of three, in the style of  . Further analysis of the rhythm suggests that the motive occurs three more times in bars 9, 15 and 17. The results of the rhythmic motive execution are as follows.

Figure 5.8 illustrates the note-level onset of the rhythmic motive in bars 1, 5, 9, 15 and 17. The black, dark and light grey lines indicate Casals' execution of the motive the first time round, repeated and in the da Capo. The duration is plotted using seconds and therefore the plotted line indicates that the longer the duration, the higher the plotted line.

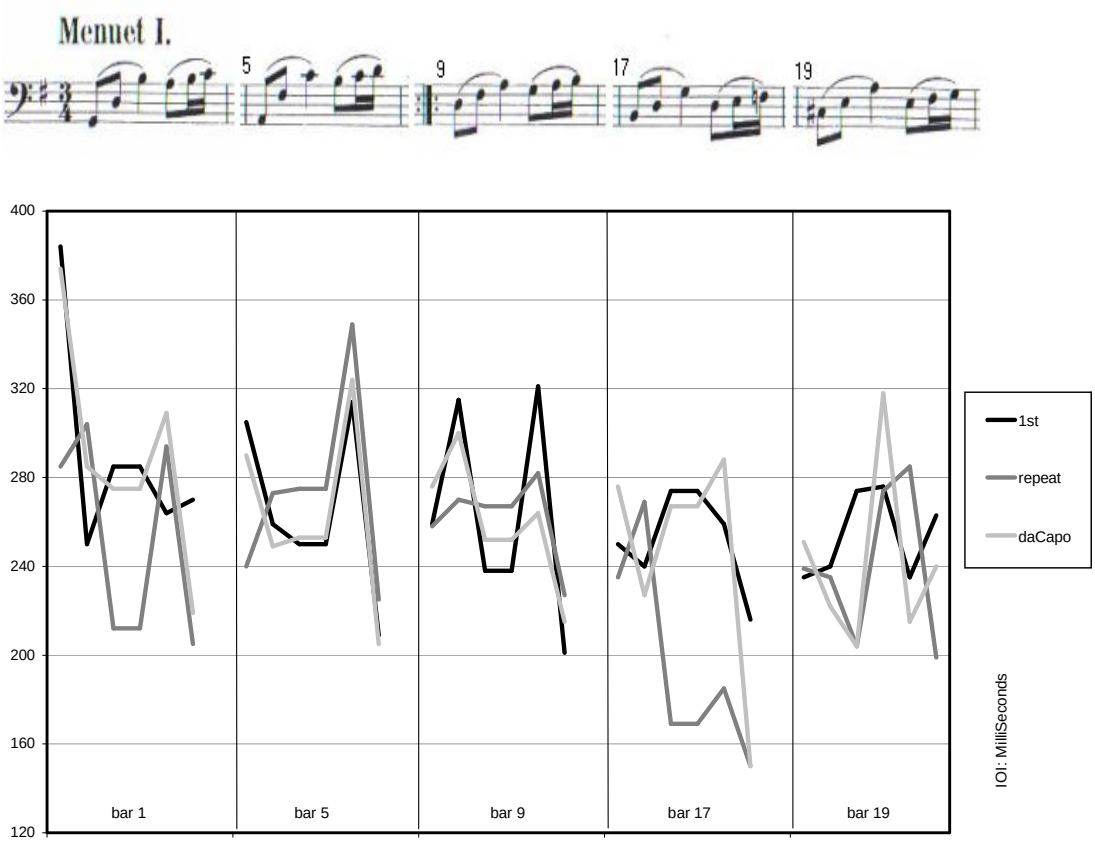


Figure 5.7. Rhythmic motive execution in the Menuet I

The rhythmic motive is executed in an inconsistent fashion throughout: it can be presumed that Casals may have regarded the rhythmic motive in bars 9-24 in a different context than its occurrence in bars 1-8.

When performing Menuet II, Casals consistently emphasises with slow rubato on the Eb4 in bar 9 and the D4 in bar 11, the highest pitches of each motive. The first beat of bar 14 is also emphasised with rubato and he slows down both on the first and third beats of bar 16, which is a phrase boundary. The second beats of bars 17 and 19 are slightly stressed with a slow swing-like rubato, although there is a sense of steady pulse.

Casals plays with great freedom in timing and his performance is characterised by a steady but not mechanical pulse: that is to say, whilst there are some variations in his rubato, the metre is perceived as regular, providing a sense of rhythmic regularity. The opening rhythmic motive of the Menuet is executed in an inconsistent fashion throughout, which could suggest that Casals may have regarded the rhythmic motive in bars 9-24 in a separate context than its occurrence in bars 1-8. A detailed analysis of note onset level is useful for detecting how the artist shapes rhythmic patterns, such as the opening rhythm of the Menuet.

5.3. Casals' expressive dynamics

J.S.Bach left dynamics marking blank, because there was no conceptual box there for him to fill. Casals points out how he intended to shape the expressive dynamics in performing Bach's cello music, which an empirical investigation will explain.

- **Casals on dynamics**

Although Bach's practice of leaving dynamics marking blank might have been conventional for his time, Casals believes that Bach's lack of indication of dynamic in his score means that he trusted the feeling and intelligence of the performer with reference to expressive dynamics. Given Bach's lack of dynamics marking, Casals asserts the role of performers in finding "the design" (Blum 1977: 142) of pieces. Pointing out that "dynamic inflexions should follow the rise and fall of melodic contour" (p. 142), he finds that expressive dynamics are relevant to the melodic function of the piece. While he says that there is always an exception, the general rule is that "if the design goes up we must give a little more tone; if it goes down, a little less tone" (p. 21).

He also remarks on expressive dynamics in the cadences of Bach. Indicating a great extent of sonority of Bach's music at the beginning and ending of phrases, Casals suggests that cadences in Bach do not represent a diminuendo, but always remain within the sonority of the terminating phrase: if the phrase is in piano, it terminates in piano, and vice-versa.

Specifically referring to performing Menuet II in the G major suite, he discusses the significance of variety which should be emphasised in the repeat performance structure, which he calls the two different "rainbows". He suggests that "an immediate repetition should provide contrast - a little more forte or piano; a change of colour" (p. 21). Given the repeat performance structure of all the dance movements of Bach's cello suite, this remark could be considered as a guideline to his principle of expressive dynamics concerning repeat structures in general.

Casals' dynamic shaping in the Sarabande of BWV1007

One way of obtaining the relationship between timing and dynamic modification in performance is by using the automatic extraction system, Sonic Visualiser. The automatic power curve is illustrated as the white horizontal curve across the wav script, which indicates intensity level and crochet beat per minute (bpm) rubato.

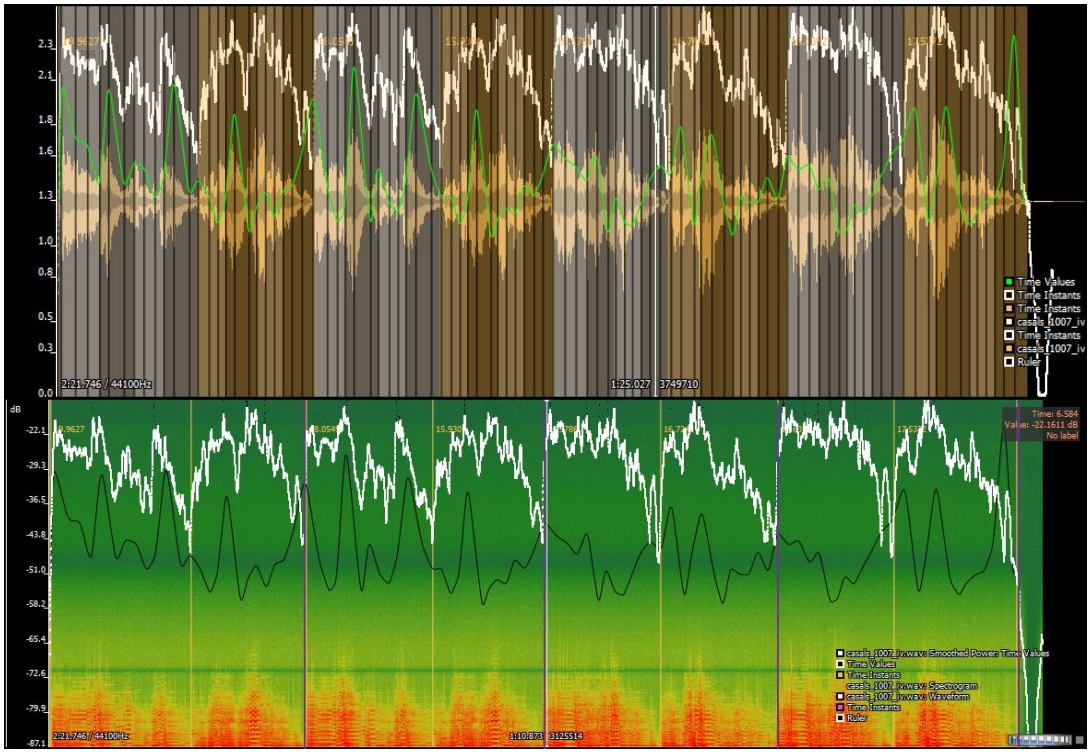


Figure 5.10. Expressive dynamics and timing, Casals (1936) on the Sarabande

Figure 5.10 illustrates the following aspects of Casals' Sarabande performance. Both upper and lower panes indicate the same sound file. In the upper pane, the white horizontal curve across the wav script indicates intensity level (automatic power curve) and the green curve the beat level (measured per crochet) timing fluctuation deriving from black vertical lines. Light / dark shades are used to indicate bar border lines and grey / yellow shades illustrate a grouping phrase structure of A (4+4) repeat A (4+4) B (4+4) repeat B (4+4). Likewise, in the lower pane, the white horizontal curve across the spectrogram indicates the intensity level and the black curve the beat level timing fluctuation. Vertical yellow lines indicate phrase boundary and to mark repeat boundary purple lines are added. The script is read as follows: the louder the dynamics, the higher the curve; the quieter the volume, the lower the curve; the faster the tempo, the higher the curve, and the slower the timing, the lower the curve.

Casals' crescendo moves towards the G major chord in the second beat of bar 2, which is followed by a diminuendo in bar 2. Following delicate dynamics in bar 3, his phrase boundary in bar 4 is marked with diminuendo. His expressive dynamics intensify in semiquaver runs in bars 6-7 with crescendo and with a forwarding direction in tempo, before the phrase ending is shaped quietly with diminuendo in bar 8. In bar 9, his crescendo and forwarding direction of expressive timing move together towards the D major chord in the

second beat and he makes another crescendo in semiquaver runs towards D#3 in bar 11, which follows a diminuendo in bar 13. Followed by a crescendo towards the A major chord in bar 14, the movement ends quietly with diminuendo.

Conforming to his performance aesthetics, dynamic shaping in bars 2 and 4 of the Sarabande corresponds to an arch shape of melodic contour. His cadence, however, always ends with diminuendo, regardless of the local dynamic, whether it is quiet or loud.

Another way of identifying dynamic level is using the Praat system: dynamic shaping firstly identifies the notably strong peaks in the software script and the decibel levels of the strong peaks are read as indicated in Table 5.3.

Table 5.3. Strong peaks of dynamic in Casals' rendition of the Sarabande

	1st	**repeat**
b 1/1	*69.93 dB*	*72.16 dB*
b 2/1	*71.36 dB*	*insignificant*
b 2/2	*76.7 dB*	*73.26 dB*
b 3/1	*69.29 dB*	*66.34 dB*
b 4/1	*72.89 dB*	*73.13 dB*
b 5/3	*70.37 dB*	*insignificant*
b 6/1	*insignificant*	*72.81 dB*
b 6/2	*77.41 dB*	*insignificant*
b 7/1	*74.66 dB*	*74.61 dB*
b 7/2	*75.84 dB*	*insignificant*
b 9/1	*73.7 dB*	*72.61 dB*
b 9/2	*insignificant*	*74.88 dB*
b 10/2	*75.22 dB*	*insignificant*
b 10/3	*insignificant*	*74.1 dB*
b 11/2	*77.7 dB*	*79.8 dB*
b 14/1	*76.54 dB*	*79.12 dB*

Casals emphasises some places over others with strong dynamic. His choice of strong dynamic peaks often corresponds to his fast rubato, although it is not always the case. It appears that Casals' relatively strong dynamic is more relevant to the Sarabande second beat and the occurrence of chord changes than the melodic arch.

There are places where strong dynamic is highlighted by slow tempo: such examples can be found in the opening G major chord, which is read at 69.93 dB and 72.16 dB (in repeat) respectively. A trilled G major chord in bar 2 is also played with slow rubato and relatively strong dynamic levels, at 76.7 dB and 73.26 (in repeat) respectively. The D4 in bar 3, which anticipates the dominant of G, is also played with both rubato and relatively noticeable dynamic level. Casals stresses the F#3 in bar 4 with dynamic level, which is read at 72.89 dB and 73.13 dB (in repeat), but is played with short rubato. Another place is a trilled B3 in bar 11, where he places relatively strong dynamic at 77.7 dB and 79.8 dB (in the repeat) and very slight rubato.

There are places where Casals places relatively strong dynamic the first time, but regards it as insignificant in the repeat or vice versa. These places require more attention, as one of them might have been a correction of the former or a mere mistake.

For instance, the B2 in bar 5 in the third beat is accentuated the first time; its dynamic is read at 70.37 dB, but this is neither stressed in the repeat nor played significantly with rubato. Nevertheless, as the stressed B2 is the tonic arpeggio, highlighting of the B2 the first time can be suggested as a mistake in the rendition, which he corrects in the repeat. The trilled C#3 in bar 6, subdominant of G, is stressed with a relatively strong dynamic peak at 77.41 dB with long rubato, but in the repeat he highlights B4 in bar 6, which is the continuation of the tonic arpeggio, at 71.81 dB, instead of the second beat. To me, highlighting the trilled C#3 makes more musical sense than stressing the B4 in bar 6, because it is the second beat, a turning point in harmony and is emphasised with trill. A similar case occurs in bar 10; Casals places a relatively strong dynamic in a trilled second inversion of the dominant chord the first time, which is read at 75.23 dB. He considers the trilled chord with slightly long rubato, due to the fact that it is the second beat, a new harmony. Nevertheless, in the repeated section, his relatively strongest dynamic becomes the F#3 in the third beat at 74.1 dB.

Both the first and second beats are emphasised with a dynamic accent the first time in bar 7 at 74.66 dB and 75.84 dB respectively, whereas the first beat is only stressed in the repeat at 74.61 dB. Thus, it can be suggested that he considers the G3 in bar 7 as the highlight of the relative dynamic in bar 7, although the second beat, D4 in bar 7, is evidently the more significant point to him in timing fluctuation. Again, highlighting of D4 provides more musical sense, due to the second beat and a turning point in harmony: sub-dominant becomes dominant at this particular point. A similar case occurs again in bar 9: the opening of the new phrase in bar 9 is emphasised with a relatively strong peak at 73.7 dB and 72.61 dB (in the

repeat), which is a continuation of the dominant chord. He also stresses the dominant 7th chord in the second beat at 74.88 in the repeated section, whereas the chord is regarded insignificantly the first time. Bar 9 appears to be a very ambiguous place where rubato is concerned. Highlighting the second beat provides more musical sense with regard to beat level and harmony.

In the Sarabande performance, Casals' dynamic peaks often relate to his choices of rubato, characteristic Sarabande rhythm and the occurrence of chord changes, rather than the melodic arch. Rather than keeping the opening dynamics of the given phrase, diminuendo is placed in the phrase boundary. Given the inconsistency of expressive dynamics in the repeat performance structure, the so-called two different "rainbows", however, might have been shaped effectively.

Casals' dynamics shaping of the Menuet of BWV1007

Casals' dynamic shaping appears noticeable in the first half of Menuet II. Unlike his dynamic shaping in the Sarabande performance, where he considers the Sarabande rhythm and harmony as significant, Casals creates arches with dynamic levels according to the melodic shape.

Table 5.4. Level of dynamic in Menuet II performances, bars 1-8

	1st		**Repeat**	
Casals	F2: b2	F2: b6	F2: b2	F2: b6
	75.9 dB	*77.1 dB*	*67.7 dB*	*71.8 dB*

Casals strongly highlights the F2s in bars 2 and 6 with dynamic levels, which can be seen as his projection towards the different Menuet in the new key of D minor. His emphases are even stronger in the first round, at 75.9 decibels (dB) and 77.1dB respectively, whereas although the F2s in bars 2 and 6 are played more strongly than other notes, his overall dynamic levels are slightly weakened, at 67.7dB and 71.8dB respectively.

Casals creates arches with dynamic levels according to the melodic curve. In other words, his dynamic shaping reflects his own performing suggestion on the rise and fall of melodic contour. He also uses a step-wise dynamic in playing the repeated sections and places stronger dynamic the first time round. Casals' handling of expressive dynamics

depends on how he perceives certain aspects more than others in the context. For instance, the findings suggest that whilst he finds more significance in the Sarabande rhythm and modulation, creating a melodic arch through expressive dynamics is important in the Menuet.

5.4. Casals' vibrato and portamento

Casals also remarks on vibrato and portamento. By investigating his vibrato and portamento through an acoustic analysis of his recordings with reference to his performance aesthetics, this study intends to uncover Casals' art of cello playing a step further.

- **Casals on vibrato**

Casals talks about the significance of applying vibrato selectively in relation to an interpretative relevance. He suggests considering vibrato as an expressive device to communicate interpretative significance rather than regarding it as a mere technical skill (Blum 1977: 134). He says "vibrato in itself cannot be expressive, because that depends on how it is applied. The vibrato is a means of expressing sensitivity, but it is not a proof of it" (*Ibid.*) In other words, one way of creating an expressive shaping in performance would depend on how selectively vibrato is applied.

To Casals, hearing all the time a beautiful vibrato is rather boring. He therefore suggests "a big vibrato in an energetic forte - wonderful! … but the sound without vibrato is very beautiful also, particularly in piano and pianissimo, [because] in pianissimo vibrato is too sweet; it is not good taste" (*Ibid.*). It is unclear whether by big vibrato he means vibrato with a wide oscillation range or its speed. Blum points out that Casals' vibrato "could invest a forte with ardent passion while not impinging upon the free, soaring power of the tone. In keeping with his conception of pellucid sonority Casals did not shy away from open strings which he sometimes made use of even in expressive melodies" (p.137).

Casals' vibrato in the Prelude of BWV1007

At this point, how Casals applies vibrato as an expressive means in the Prelude of J.S.Bach's G major solo cello suite BWV1007 will be investigated.

The presence of straight horizontal lines in the space of the spectrogram concerning the G2 can suggest that the opening bar is played in the first position using open strings (see Figure 5.12) and he also hardly applies vibrato, even on the fingered note.

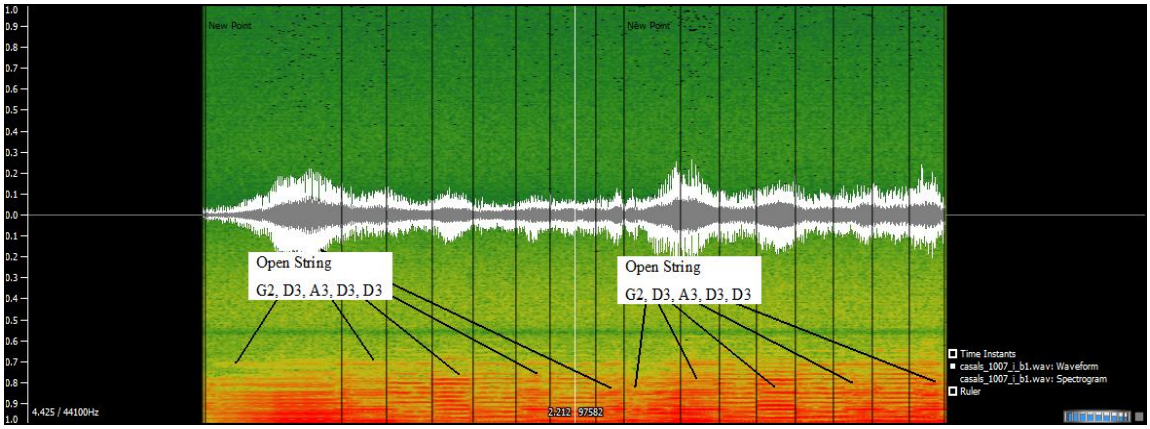


Figure 5.9. Casals' non-vibrated sound in spectrographic analysis: bar 1, Prelude

The use of vibrato becomes noticeable in the C4 in bars 2 and 3, and in the B3 in bar 4, where his vibrato speed is 7.14 - 7.69 cycles per seconds (cps). Given that neither vibrated note means much in terms of the grouping, rhythmic, harmonic or melodic structure of the first four bars of the Prelude, it can be suggested that vibrato is applied in the specified passage as technical habit. The application of vibrato from bar 5, however, can be suggested as having interpretative relevance. He places vibrato in the B2 in bar 5, which leads to the V of D in the following bar 6. At this point, he begins to place vibrato in a grouping of eight semi-quavers: the C#2 in bar 6, F#3 in bar 7 and the E2 in bar 8; that is, V-I-ii of D respectively. In bars 8 and 9, vibrato is more frequently placed in the grouping of four semiquavers, highlighting the D chord efficiently. The G#3 in bar 11 and the D#3 in bar 13 are frequently vibrated, sensing the chord E. In returning to G major, vibrato is less frequently noticed in bars 14-19. Given that the A3-C#4-D4 in bar 22 are highlighted with ritardando and vibrato, his extensive vibrato on the C#2 in bar 20 and subsequent crescendo with the intensive application of vibrato on the C#4 in bar 22 appears to be preparation for a grand phrasing of the D chord in bar 22. The vibrato speed of C#4 in bar 22 is 8.33 cps, which is relatively fast in comparison to his average speed of 7.5 cps. The boundary note, D4, is phrased with diminuendo and a lesser degree of vibrato (indicated as a gradual disappearance of crinkle-line in the spectrogram; see Figure 5.12). Vibrato speed is 7.69 cps.

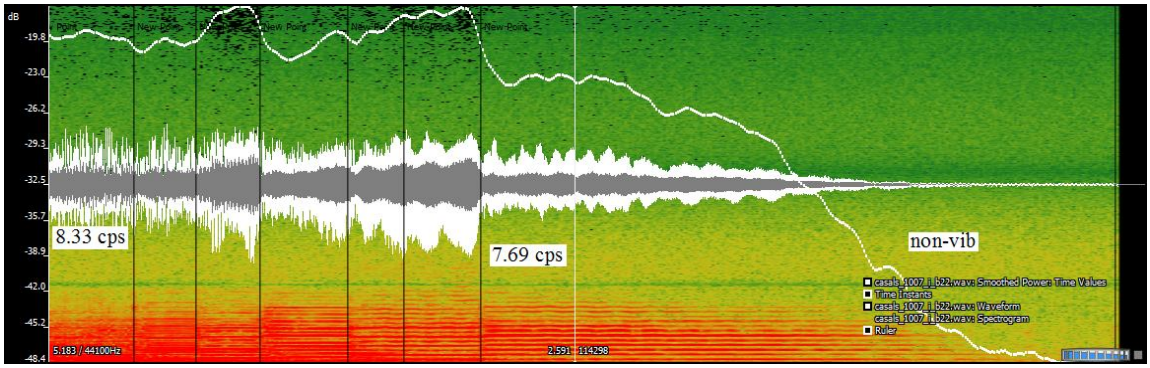


Figure 5.10. Casals' vibrato in bar 22, Prelude

Corresponding to his own performing philosophy, Casals' speed of vibrato in bar 22 relates to the intensity level of volume; i.e., his vibrato gradually disappears as expressive dynamics become quieter.

A descending chromatic motive Eb4-D4-C4 in bar 24 and a descending whole tone motive C#4-B3-A3-G3 in bars 26-27, a grouping of four semiquavers, and another descending motive C4-B3-A3-G3, each beginning the pitch of the scale passages in bars 29-31, are highlighted with vibrato. The ascending chromatic motive leading to G4 from F3 in bars 37-39, followed by a descending split third scale passage in bars 34-36, is also highlighted with noticeable vibrato. The intensity of vibrato becomes stronger with crescendo in the G4 in bars 39-and 40 and F#4 in bar 41 and the final G triad (see Figure 5.13).

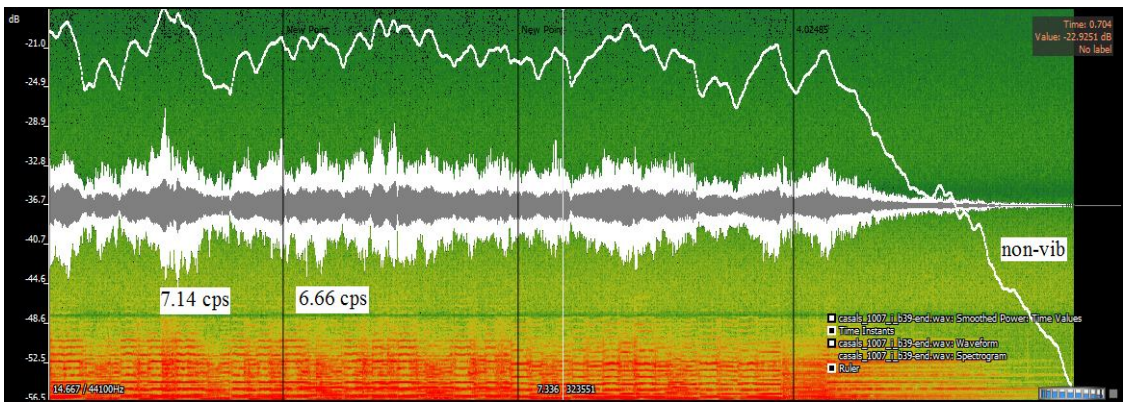


Figure 5.11. Casals' vibrato in bars 39-42, Prelude

The vibrato speed of this section is within the range of 6.66 - 7.14 cps. As indicated in Figure 5.13, vibrato gradually disappears, as expressive dynamics become quieter at the ending of the movement.

Due to largely identical rhythmic values throughout the movement, the selective application of vibrato can be speculated as intending to highlight the phrase or grouping

structure, the change of chord, and pitch relation, such as chromatic and whole tone motive. In Casals' case, vibrato seems to be applied frequently at the beginning of the phrase and/or grouping structure. His phrase boundary is characterised by quiet dynamics without vibrato. The average speed of Casals' vibrato is 7.45 cps (cycles per second), and ranges between 6.6 cps - 8 cps. Although vibrato seems to be applied for an expressive purpose in most parts of the Prelude, it can be suggested that contrary to his own sceptical view of applying vibrato as a practical habit and/or technical display, Casals' use of vibrato in the first four bars of the movement can be considered as a mere practical habit. In bars 5 to 22, vibrato is applied mostly to express the building up of modulation and grouping structure and in bars 23 to 42 vibrato plays a role in creating the melodic line within the musical work.

Detecting the selective use of vibrato in the monophonic movement with the forthright rhythmic writing of the Prelude is fairly straightforward. However, it becomes more complicated to detect the selective application of vibrato in partially polyphonic movements with complex rhythms, such as the Sarabande movement. That is, it is difficult to recognize whether the perceived vibration derives from overlapping harmonics of multiple stopping. By using spectrographic analysis, the source of perceived vibration can be identified in a combination of audible and visual ranges (see Figure 5.12).

Casals' vibrato in the Sarabande performance

Moving on to investigate Casals' selective use of vibrato in the Sarabande from the same cello suite, the opening multiple stop in G is expressed with vibrato. The selective use of vibrato is apparent from bar 2; Casals provides vibrato on the opening F#3 in a grouping of four.

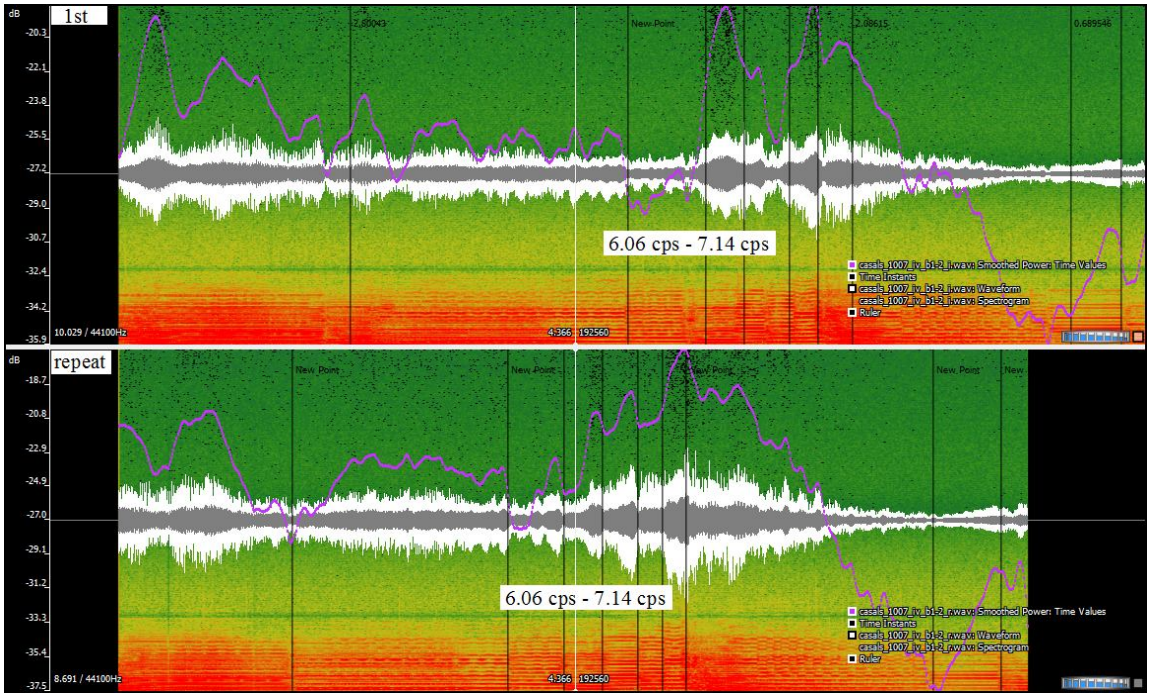


Figure 5.12. Casals' vibrato in bars 1-2, Sarabande: repeat structure

Whilst vibrato speeds of this movement are within the range of 6.06 cps - 7.14 cps, his handling of vibrato remains identical in the repeat structure.

Followed by a trilled multiple stop in G, he avoids vibrato by playing A3 on an open string. Given that he uses vibrato constantly in bars 3 and 4, the use of open D in playing D3 in bar 4 can be perceived as rather abrupt. Continuous vibrato is perceived up to the second beat of bar 5 (still in D chord), but rather unexpectedly, the following semi-quaver run to the first beat of bar 6 in IV of D is played without any vibrato. Casals' use of continuous vibrato is detected up to the second beat of bar 7, semi-quaver runs in V of D. He indicates a semi-quaver grouping through the application of vibrato on the E3 in bar 7. Followed by the open D (D3), he ends his phrase in D2 without vibrato in bar 8.

Continuous vibrato is perceived in the dominant 7th of G multiple stop in bar 9, which leads to a vibrated multiple stop in G in bar 10. Followed by a non-vibrated bridging semi-quaver run in bar 10, a trilled double stopping in V of E is joined by another non-vibrated semi-quaver run in bar 10. He places vibrato in D#3 in bar 11 in a grouping of four and again in the F#3 in the third beat and the G3 in bar 12. Although he places vibrato in the E3 (second beat), he ends the phrase quietly again with non-vibration on E2. Whilst returning double and multiple stopping in G is enjoyed with vibrato, associated demi-semi and semi quaver runs are played quickly in bar 13. Followed by a vibrato in G#2 in bar 14 in a grouping of four and another vibrated multiple stopping (ii of G), he plays double stopped semi quavers in G

quietly, without vibrato. He then suddenly applies vibrato in a bridging semi quaver run on the third beat of bar 15 leading to a final vibrated note, the D3 in bar 16 in a grouping of four. He finishes the movement graciously without vibrato using the open G.

Casals' selective use of vibrato indicates interpretative relevance of phrasing and also largely depends on the rhythmic value of notes such as longer duration multiple stops. It appears, however, that other cellists, such as Cassadó and du Pré, might also apply vibrato selectively in performing the Sarabande; they vibrate all the fingered notes unless rhythmic value is as short as demi-semi quavers. In other words, the remaining non-vibrated notes by Cassadó and du Pré are either open stringed notes or demi-semi quavers. Corresponding to Casals' suggestion of vibrato being associated with the level of dynamics, another characteristic use of vibrato by him is the phrase boundary, where the ending of each phrase is frequently emphasised without vibrato. He also uses vibrato as a clear indicator of grouping structure; that is, vibrato is often applied to the starting notes of semi-quaver runs.

To sum up, Casals' vibrato was measured in the Prelude and Sarabande: corresponding to his performance aesthetics of phrasing and vibrato, he applies vibrato exquisitely at the beginning of the phrase and/or grouping structure, whereas his phrase boundaries are characterised by quiet dynamics without vibrato. The average speed of Casals' vibrato is 7.45 cps (cycles per second), which ranges between 6.6 cps – 8 cps and the average width of his vibrato is 48 cents, which ranges between 42 cents – 62 cents. Due to largely identical rhythmic values of the Prelude, the selective application of vibrato can be speculated as intending to highlight the phrase or grouping structure, the change of chord, and pitch relation, such as chromatic and whole tone motive. In the Sarabande performance, Casals' selective use of vibrato indicates the interpretative relevance of phrasing and also largely depends on the rhythmic value of notes, such as longer duration multiple stops.

- **Casals' portamento**

The investigation of Casals' portamento begins with the findings of the previous chapter, which indicate that too few portamento data are available to conceptualise the individual portamento style of any cellist other than Casals. Whilst Casals' glide mostly falls into Leech-Wilkinson's (2006) category of portamento, a way of making expressive moves from one pitch to another rather than glissandi (an independent gesture itself), Casals (Blum 1977: 125-6) used the term glissando to denote the audible expressive slide referred to as portamento. Casals never hesitated to follow his intuition in the use of glissandi: 'Don't be afraid of the glissando'. He particularly encouraged the glissando to be the indispensable

bridge leading from the long sustained note (p.126) and from the low note to the high (*Ibid.*).

Portamento in the Sarabande of BWV1007

In order to illustrate how conventional or otherwise Casals' portamento would be in relation to other renditions, I also provide the portamento occurrence rate of six other renditions. Table 5.5 indicates Casals' use of portamento in the first eight bars of the Sarabande[71] in J.S.Bach's G major cello suite BWV 1007.

Table 5.5. Overall portamento in performing the G major Sarabande, bars 1-8

Cellist	Date	Occurrence	1st	Repeat	Speed
Casals	1936	7	2	5	123.2

Other renditions also discussed

Cellists	Date	Occurrence	1st	Repeat	Speed
Cassadó	1957	2	1	1	85
du Pré	1962	2	1	1	112
Ma	1983	3	2	1	89.6
Maisky	1985	1	n/a	1	50
Rostropovich	1995	3	2	1	135.6
Ma	1997	1	1	n/a	96

Conforming to his own performing suggestions, Casals is not hesitant about using glissando as an indispensable bridge leading from the long sustained note (in bars 1, 5 and 6).

As shown in Table 5.5, portamento indeed remains throughout the 20th century, although its applications might have become less frequent post-WW2. In spite of having studied with Casals, Cassadó's playing does not indicate enthusiasm for portamento. Whilst Rostropovich's speed of portamento is slower than any other of the investigated cellists, Ma's stylistic changes between the 1983 and 1997 recordings are noticeable.

Glide speed can be affected by the performed score duration followed by portamento and its correlation was computed. Casals' slide speed and the following IOIs correlate fairly (r = 0.43, p = 0.32). I also consider correlation between glide speed and pitch leaps. For the calculation, I set ascending interval as plus (+), and descending interval as minus (-). Casals'

[71] The initial eight bars are in G major and phrase is in half cadences and in repeat performance structure. The selected excerpt contains 64 onsets. The IOIs are defined as the time between two successive events, which can also be considered as performed score duration.

slide speed and pitch leaps correlate fairly (r = 0.74, p = 0.05). These positive correlations between portamento speed and other dimensions such as following performed score duration and pitch leap in both repertoires can be suggested as Casals' portamento style. At this point, how the application of portamento might vary in the repeat performance structure will be considered (see Table 5.6).

Table 5.6. Portamento in the repeat structure of the Sarabande

a. First Time

Cellists	Glided places	Pitch leaps	Slide speed	Following IOIs
Casals	b6, 5th-6th note onsets	dsc 2nd	120	169
	b8, 1st-2nd note onsets	asc 4th	160	270

b. In Repeat

Cellists	Glided places	Pitch leaps	Slide speed	Following IOIs
Casals	b1, 4th-5th note onsets	dsc semitone	150	2109
	b5, 5th-6th note onsets	dsc 2nd	80	196
	b6, 5th-6th note onsets	dsc 2nd	108	166
	b7, 12th - b 8, 1st note onsets	dsc 4th	105	293
	b8, 1st-2nd note onsets	asc 4th	140	224

The application of portamento varies in the repeat structure. That is, more frequent portamento occurrences are witnessed in the repeat, which can suggest exaggeration and emphasis of phrase in the repeat structure. In contrast to Casals' aesthetics of glissando, in which ascending pitch leaps provide a natural place to slide, he actually places glides more frequently in descending pitch leaps in performing the Sarabande.

Following his remarks about portamento, Casals is not hesitant to use glissando as an indispensable bridge leading from the long sustained note in both renditions. However, in contrast to his aesthetics of glissando, that ascending pitch leaps provide a natural place to slide, he actually places glide more frequently in descending pitch leaps in performing the Sarabande. Both Casals' slide speed in relation to the following IOIs and his slide speed in relation to pitch leaps correlate fairly.

Findings suggest that no stylistic change was detected in Casals' vibrato and portamento between the Prelude performances of 1936 and 1954. Changes in overall tempi of the Prelude and Menuet, as well as correlation of note onset level rubato of the Sarabande and the Menuet, can be suggested as interpretative alterations.

It is indeed true that the 1936 recording had brought “life” to the Bach cello suites by contributing to their adoption as concert repertoire, and in addition the 1954 footage provides another classic insightful Bach “in the best sense of the world”.

5.5. Casals' musical expression

Based on Casals' philosophy about musical expression in performing Bach, this chapter has investigated the ways in which musical expression is shaped by Casals in performing the selected three movements of J.S.Bach's cello suite in G major BWV1007.

Two very important issues arise from this investigation. Firstly, through a re-evaluation of published interviews and a further empirical investigation of the handling of musical expression in the repeat performance structure, this study shows how Casals' performances of Bach on record generally conform to his own performance aesthetics. Secondly, no stylistic change in vibrato or portamento is detected between his 1936 recording and 1954 footage. Changes in overall tempi of the Prelude and Menuet, as well as correlation of note onset level rubato of the Sarabande and the Menuet, can be suggested as interpretative alterations

Returning to the research question arising in the concluding part of the previous chapter on the pedagogical influence of Brahms performance trends, it can be suggested that the unique performing philosophy of Casals, which his own performances conform to, might have attracted the younger generation of cellists to have direct or indirect pedagogical relationships with the cellist.

Chapter 6

Artistic Innovations of Rostropovich's Prokofiev

This chapter discusses the artistic innovations of the cellist Mstislav Rostropovich in performing Prokofiev, with whom the cellist played a major collaborative role in the compositional process. Musical expression in Rostropovich's two renditions of the second movement of Prokofiev's cello sonata op.119 are empirically analysed and compared with two other selected recordings. Given the cellist's involvement in the completion of the current format, the shape of the four available renditions of Prokofiev's "unfinished" solo cello sonata op.134 (which Rostropovich never recorded) is also considered.

6.1. Rostropovich and Prokofiev

Returning to the research question arising in the concluding part of the chapter on the Brahms performance trends, I consider what kind of stylistic features of Rostropovich's musical expression on record would have influenced the younger generation. If an empirical study of Casals' artistic style were intending to understand the performance aesthetics of the earlier half of 20th-century cello playing through the words of and performances by the cellist, the major collaborative role of Rostropovich for the cello music written in the post WW2-era is one of the significant aspects in the latter half of 20th-century cello playing. Rostropovich's Prokofiev has been chosen because given the collaborative contribution of the cellist it seems appropriate to investigate Rostropovich's performance styles, focusing on the works that the cellist collaborated on in the compositional process. Since Rostropovich's ideas about performance are much more ambiguous than those of Casals, a different approach to the previous chapter has been taken in the investigation of a specific artistic characteristic. In this chapter, I intend to discover the artistic innovations of the cellist Mstislav Rostropovich in performing Prokofiev by comparing his two renditions of the second movement of Prokofiev's cello sonata op.119 and also by analysing an incomplete composition without a performance tradition.

Rostropovich left two recorded renditions of Prokofiev's cello sonata op.119; one is from the première in 1950 and the other was recorded at a studio in Moscow five years later. The first case study concerning the second movement of op.119 considers Rostropovich's artistic style of musical expression in the two renditions. An empirical analysis investigates Rostropovich's handling of musical expression in these renditions; I also make a comparison with the two other recordings by different artists and also in relation to the composer's notated markings of dynamics and tempo (the metronome marks, for instance).

At the time of the composer's death in 1953, Prokofiev's solo cello sonata op.134[72] was left "unfinished". Based on his involvement in the work from the planning stage, the cellist contributed a major part to the completion of the current format. I consider how Prokofiev's "unfinished" solo cello sonata op.134 is expressed in the context of performance practice; although Rostropovich never recorded the "unfinished" solo sonata, the four renditions of op.134 are available in commercial recordings.

[72] The "unfinished" composer's sketch later became the concert repertoire. Rostropovich collaborated with Prokofiev in the planning stage of the work and after the composer's death; the cellist also contributed towards the completion of the work in the current format.

6.2. Rostropovich's repeated renditions of Prokofiev's op.119

Focusing on the second movement of Prokofiev's cello sonata op.119, I intend to discover how Rostropovich's styles remain similar or change when performing the same repertoire between the première and the studio recording of five years later. A comparative analysis is made, paying attention to the two renditions and also making a comparison with the recordings by André Navarra (1958) and Yo-Yo Ma (1990), as well as in relation to the dynamics and tempo markings (the metronome marks, for instance) in both editions. I discuss the historical background of the sonata and why the certain renditions were chosen for a comparative investigation. An empirical analysis of performance includes the overall tempo, phrasing with reference to expressive timing and the range of dynamics, the similarity on timing fluctuation and the shape of the motives.

- **Historical background of the sonata and investigated performers**

Rostropovich recalls that the successful première of Myaskovsky's second cello sonata led to his close collaboration with Prokofiev. The cellist was thrilled to be approached by the great master Prokofiev and said that listening to the première of Myaskovsky's second sonata inspired the composer to write a large-scale cello sonata. Some time later, Rostropovich received the promised sonata from Prokofiev and was asked to come and play it for the composer at the Nikolina Gora (outside Moscow) and share cellistic ideas with regard to this new work. In this particular meeting, Prokofiev suggested to the cellist that Richter should play the piano part of the cello sonata. The cellist talks fondly about Prokofiev's character as a collaborative composer; i.e., contrary to any other composers that the cellist had collaborated with, Prokofiev had an open-minded collaborative process with performers, and therefore revisions and/or amendments were often made as the result of collaboration. The cello sonata op.119 (written in 1949) is the first work to be produced in collaboration with Rostropovich. The success of the sonata's première inspired Prokofiev to plan three more works for the cello, op.125, op.132 and op.134.[73]

To Vladimir Blok (1973), the similarity in writing styles between Prokofiev's op.119 cello sonata and the fifth symphony can be suggested as epic (which he views as the Russian nationalistic character) and lyric. He states that

> The Sonata op.119 broadens the ordinary borders of a chamber work and presents a developed symphonic composition with a large range of its

[73] Nevertheless, the Symphony-Concerto op.125 (the revision of the first cello concerto op.58, which Rostropovich did not collaborate on) is the only work that Prokofiev himself completed after the Cello Sonata op.119 due to his sudden death in 1953.

imaginative content.

The world première of the sonata op.119 was in Moscow on 1st March 1950 by Rostropovich and Richter, in the presence of Prokofiev. One of the close friends of Prokofiev, Myaskovsky, wrote in his dairy: 'Yesterday Rostropovich and Richter gave a first public performance of Prokofiev's Cello sonata – an amazing, first-class work' (Nestyev 1960: 418).

A recording of the première concert is commercially available and is therefore used as the starting point of this case study. The successful première of the sonata led to more collaborative works between the cellist and Prokofiev, which include a sketch of the "unfinished" solo cello sonata op.134. Five years after the première, the sonata was recorded by the Rostropovich/Richter duo in a studio in Moscow. Many different record labels have released the 1955 recording[74] and I have studied Chant du Monde LDX 78388.

André Navarra and Alfred Helecek's recording has been selected, because it is the earliest available Western rendition. Considering the similarity of expressive timing between Rostropovich and Ma in performing the second movement of the Brahms E minor cello sonata (see Chapter 4), the recording by Yo-Yo Ma and Emanuel Ax has also been chosen. Table 6.1 shows the details of the recordings that have been investigated for this study.

Table 6.1 Selected recordings of Prokofiev's cello sonata used in this investigation

Prokofiev: *Cello Sonata op.119 in C* *Moderato – Andante dolce*

Artists	Dates	Label	Duration
Rostropovich (cello) Richter (piano)	1950 (1997)	EMI Classics 72016	04'35"
Rostropovich (cello) Richter (piano)	1955	Chant du Monde LDX 78388	04'40"
Navarra (cello) Holecek (piano)	1958 (2003)	Supraphon MD 3711	04'49"
Ma (cello) Ax (piano)	1991	Sony Classical 46486	04'52"

- **Overall tempo**

As for the composer's original materials, none remain of the second movement in the manuscripts and autograph materials. Rostropovich edited the cello part of both the first edition, Muzgiz in Moscow 1951, and the current UK distributed editions,[75] Boosey &

[74] For further information, see Paul Geffen's online Sviatoslav Richter Discography (http://www.trovar.com/str/discs/prok.html).

[75] That is, the first edition Muzgiz and current UK distributed ones, Boosey & Hawkes and C.F.Peters. The suggested tempo in these editions and the given precise metronome markings could confuse the first time performer of this repertoire. For instance, 96 per crotchet is given as the exact metronome markings of the Moderato first and third parts of the movement, as the suggested tempo in these editions. The metronome

Hawkes[76] and C.F. Peters. The Muzgiz, Boosey & Hawkes and C.F. Peters editions were all examined in this investigation. Metronome markings, timing, dynamic, notations, slurs and even fingerings and bowing suggestions are consistent between the three editions, which gives me confidence to say that we can assume the metronome marking as Rostropovich's own. Table 6.2 indicates the overall tempo of Rostropovich's two renditions and the additional two renditions by André Navarra and Yo-Yo Ma.

Table 6.2. Overall tempo of the selected renditions

	The first edition 1951	Rostropovich 1950	Rostropovich 1955	Navarra 1958	Yo-Yo Ma 1990
[A]	96	112	106	102	99
[B]	60	96	92	87	86
[A]	96	115	106	106	99

The overall tempo of the selected renditions indicates that there is a clear boundary in the performers' perception of the movement as a three part form. Rostropovich's tempo in the 1950 première is fairly fast and metre and pulse changes are well indicated in the casting of different thematic ideas. The overall tempo of the 1950 première in the first part is around 112 crotchet beats per minute (bpm), the second part is about 96 bpm, and the third part is slightly faster than the first. The steadiness in tempo is perceived in the 1955 performance with a slower tempo. The Moderato and the Moderato primo of the 1955 performance are about 106 bpm, which is slightly slower than the 1950 première and the Andante dolce is 92 bpm, which again is slightly slower. Judging from the overall tempo of the 1955 rendition, which is slightly slower than the première, it can be assumed that having performed the sonata in the première, the cellist found a more comfortable tempo in the studio recording version in 1955.

- **Phrases in the 1950 première and 1955 performance**

The scherzo second movement of the cello sonata op.119 is in F major and ABA form. The ternary form is divided into smaller sections: the first section is divided into three sections (bars 1-23, 24-34, 35-48) and the second part is in two (bars 49-66, 67-90). The third part, a

marking of 96 per crotchet is understood as a fast Andante, rather than a slow Moderato. The second part, Andante dolce, is given as 60 per crotchet, which is considered more as an Adagio than an Andante.

[76] Boosey & Hawkes is the copyright owner of all Prokofiev's music that is distributed in the UK, which is regarded as of value because it is an urtext edition.

shortened version of the first part, stands on its own. A clear distinction in Prokofiev's writing is illustrated between the first and second part in modulation and with changes in metre and tempo marking. The internal contrasts of the movement, i.e. the cheerful opening and ending that require a brilliant display of various cello techniques and the lyrical Andante dolce in Bb major, require a singing quality from the cello. An application of different metre before the arrival of a new thematic idea suggests (e.g. in bars 13, 24, 50) that Prokofiev's consideration of individual characters in thematic materials is verified by metre, which acts as a recognisable boundary between one thematic idea and another.

Phrase structure is often considered as a starting point of empirical performance investigation. Phrasing is a primary concern for performers in the process of interpretation, because its structure is associated with the music's formal designs. MR and SR in the following text indicate Mstislav Rostropovich and Sviatoslav Richter respectively. Table 6.3 indicates how phrase boundaries are expressed with timing and dynamic in performances.

Table 6.3. Phrase boundaries in MR/SR's performances of the second movement

	Phrase	Grouping	Boundary	Cadence[77]	1950	1955
A:	b1 - b6	4+2	F: I - V	HC	*dim, rit*	*dim, rit*
	b7 - b13	4+2+1	F: I - V	HC	*dim, rit*	*dim, rit*
	b14 - b17	2+2	F: I# - V	HC	*cresc, rit*	*cresc, rit*
	b18 - b24	2+4+1	F: V - V/V	HC	*cresc, accel*	*cresc, accel*
	b25 - b28	4	Ab: IV - V	HC	*cresc, accel*	*cresc, accel*
	b29 - b34	4+2	F: IIIb - I	PC	*dim, rit*	*dim, rit*
	b35 - b40	4+2	F: I - V	HC	*dim, rit*	*dim, rit*
	b41 - b49	4+4+1	F: V - I	AC	*dim, rit*	*dim, rit*
B:	b50 - b57	4+4	Bb: II - V	HC	*cresc, rit*	*cresc, rit*
	b58 - b66	4+5	Bb: V - I	AC	*dim, rit*	*dim, rit*
	b67 - b77	5+5	Bb: V#7 - VI	DC	*dim*	*dim*
	b78 - b89	4+4+4	Bb: II - V	HC	*dim, rit*	*dim, rit*
	b90 - b93	4	Bb: I - VII7	DC	*dim, rit*	*dim, rit*
A:	b94 - b99	4+2+1	F: I - V	HC	*dim, rit*	*dim, rit*
	b100 - b104	2+4	F: I# - V	HC	*dim*	*dim*
	b105 - b113	4+3	F: V - I	AC	*dim, rit*	*dim, rit*

As can be seen in Table 6.3, phrase boundaries are executed in similar fashion in the two performances, although there might be differences in the range of tempo and dynamic modification. Overall, ensemble togetherness is effectively achieved in both performances with regard to tempo modification and dynamic marking.

Moving on to investigation of how performance phrases are structured at a macro level, expressive timing was considered. Figure 6.1 illustrates the timing fluctuation of the première performance of the cello sonata second movement. The arrows in Figure 6.1 indicate the boundaries of the three part form, ABA.

[77] The abbreviation of cadence is as follows: AC indicates authentic (V-I, or often V^7-I, also known as perfect and complete) cadence, HC half (ends on V, also known as semi), DC deceptive (ends on something other than I or V, also known as interrupted and false) and PC plagal (IV-I, also known as Amen).

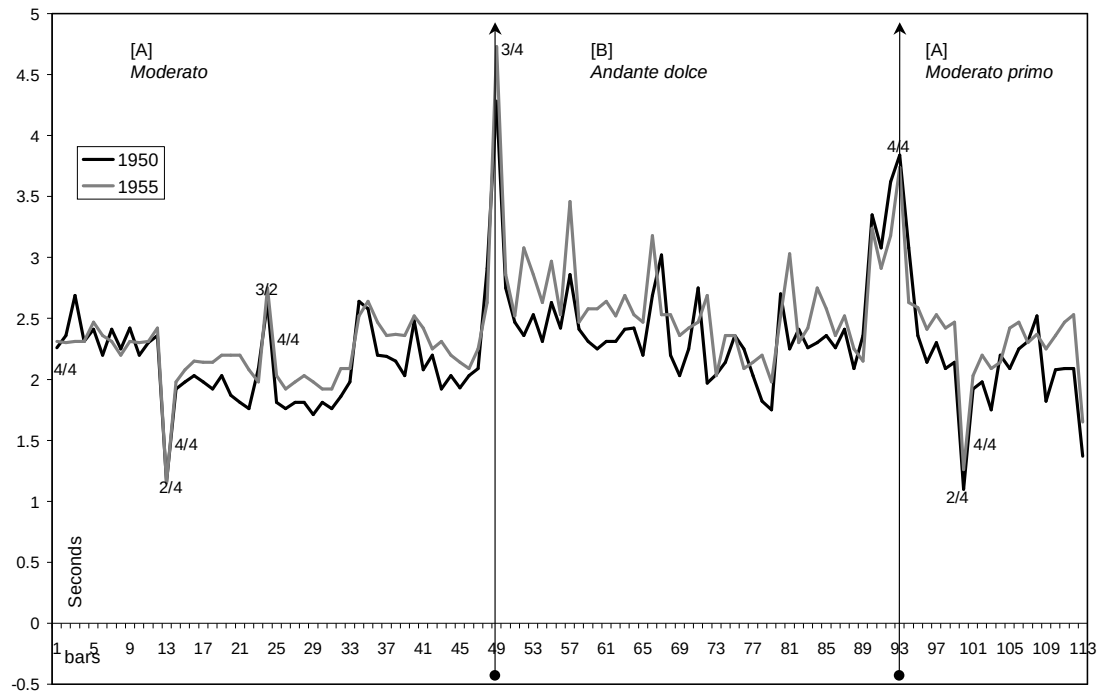


Figure 6.1. Expressive timing of the sonata op.119 second movement: the 1950 and 1955 performances

In this timing fluctuation graph, changes in tempo and metre are indicated with visualised lines: the slower the tempo, the higher the line. The black line is the 1950 rendition, the grey the 1955. Prokofiev's changes in metre in writing the movement, in particular, are indicated in MR/SR's timing fluctuation of the two performances, which is visible in the graph. For instance, the timing fluctuation graph indicates the 4/4 changes to 2/4 in bar 13 for the duration of a single bar and returns to 4/4 in bar 14. The metre changes to 3/2 in bar 24, and returns to 4/4 in bar 25. The meter changes to 3/4 in bar 50 and returns to the original time signature of 4/4 in bar 90, which changes to 2/4 in bar 100 for the duration of a single bar and returns to 4/4 in bar 101. It can also be seen that MR/SR's timing fluctuation in the première performance shows a clear boundary between the thematic ideas. That is to say, the F major thematic idea (a) is executed in around 2.2-2.4 seconds in bars 1-12, whereas the contrasting idea (b) is played in around 1.8-2 seconds.

In the 1950 première performance, SR opens the movement in a steady tempo and he places a slight tenuto on the second beat of the F major chord. The first fourth descending progression F3-E3-D3-C3 in the low register of bars 1-2 is executed with a clear articulation in both the 1950 and 1955 performances. A perceptible tenuto is placed on the second beat of bar 3; the F major chord with passing tones and chromatic passages in bars 3-4 are executed

with slight diminuendo in both performances.

A tenuto on the cello pizzicato C3 in bar 6 is perceptible in both performances, which can be interpreted as MR's emphasis with rubato in HC, but slowing down in the boundary is more effectively achieved in the 1955 performance than the première. MR-SR's execution of the transposition in bars 7-12 appears similar to the ways in which bars 1-6 are performed, although more exaggeration of expressing chromatic motion is perceived in bars 9-10, where diminuendo is supported by slight ritardando.

Changes in the mode of execution are observed between the 1950 and 1955 performances in bars 14-23. For instance, in the 1950 première performance, MR's steady bow stroke of F2 and double-stopping D4/G#3-A3/F3 in bars 14-15 appears to emphasise the harmony changes of I-IV-III. MR places hurrying rubato on the pizzicato in bars 16-17 with slight crescendo, which can also be seen as highlighting harmonic modification, VI-III-I#-V. In the 1955 performance, the sense of steadiness can be perceived not only in MR's legato stroke execution in bars 14-15 but also in the pizzicato in bars 16-17. MR places a strong accentuation on the pizzicato on the beats, which also makes MR's rubato sound steadier. Application in various degrees of timing fluctuation, hurrying rubato in the 1950 première and steadiness in the 1955 in bars 14-17 might suggest that the 1950 première shows a spontaneous side of Rostropovich, whereas the studio recording provides a refined version.

The HC in bar 17 is highlighted with crescendo and ritardando and again the boundary highlighting is more effectively achieved in the 1955 performance, with a wider range of slowing down than the première. MR's rubato in bars 16-23 is characterised as hurrying and rushing rather than taking time. His rubato in bar 22 is highlighted with a crescendo, which anticipates the modulation to Ab in bar 25. Overall, MR tends to emphasise his perception of harmonic changes with various degrees of timing fluctuation, which is accompanied by dynamic modification in performance and can be suggested to be one of the characteristic features of MR.

A transitionary passage in bar 24, another HC, is emphasised with accelerando and crescendo in both performances. Crescendo and accelerando in bar 24, however, appear to emphasise ascending chromatic expression rather than the HC. Bouncing effects are efficiently projected in bars 25-32 by MR in both performances. Considering that the piano's Ab pedal points in bars 25-33 are executed rhythmically, providing a sense of march on the beginning of the first beat, it appears that MR/SR considers the note on the first beat as the main note. In chromatic transitionary passages in bar 28 (and their transposition bar 32), the dominant of Ab is emphasised with accelerando. Another HC in bar 28 is also marked with

crescendo and accelerando in both performances, which also appear to emphasise ascending chromatic expression rather than the HC, as in the case of bar 24. The plagal cadence in bar 34, i.e. another F major transitionary passage in bars 33-34, is emphasised with a diminuendo and a large-scale ritardando. The HC in bar 40 and the authentic cadence in bar 49 are emphasised with diminuendo and ritardando in both performances, in which SR's ritardando and diminuendo in bars 47-49, in particular, illustrate a smooth transitionary passage.

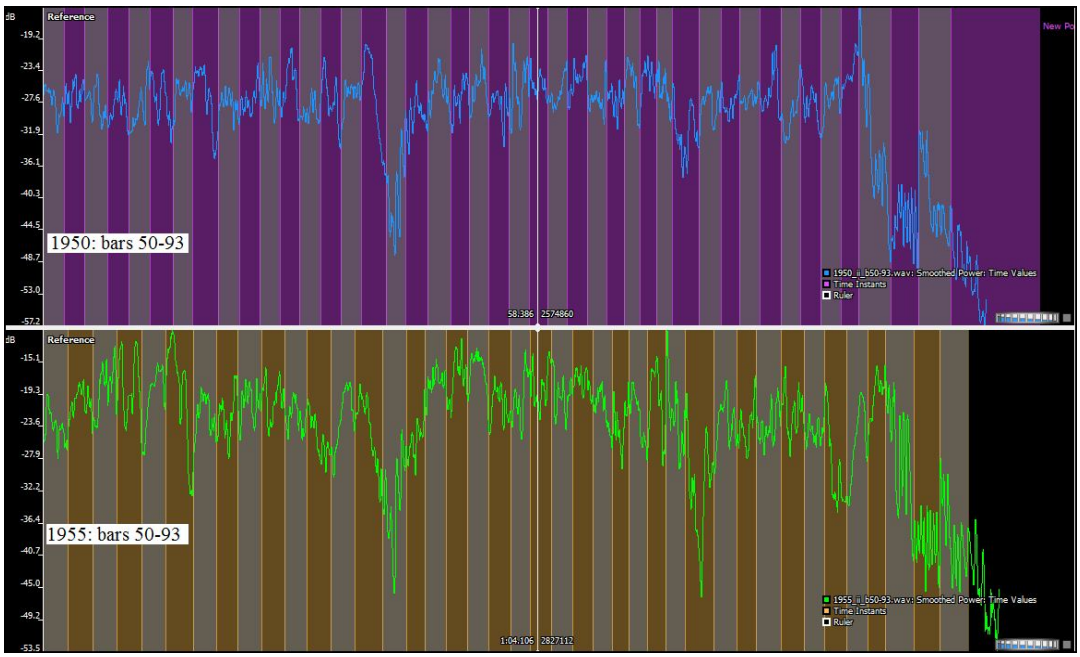


Figure 6.2. Expressive dynamics in bars 50-93: the 1950 and 1955 performances

Figure 6.2 indicates expressive dynamics in bars 50-93, the Andante dolce; the upper pane the 1950 rendition, the lower the 1955. The automatic power curves are illustrated across the Sonic Visualiser script as the blue and green horizontal curves in the upper and lower panes respectively, which indicate intensity level. Light / dark shades are used to indicate bar borderlines.

In the 1950 première performance, MR makes a crescendo on the D3 in bar 50 towards the Eb3 in bar 51, I-II in Bb major and MR makes similar expressive motion in bars 58-59 and 82-83, where the motivic parallelisms occur. Expressive parameters are executed in a similar manner in the 1955 performance, although they are projected on a smaller scale than those of the première performance. The HC in bar 57 is end accentuated with crescendo and ritardando in both performances, although a wider range of ritardando is used in the 1955 performance.

The AC in bar 66 is emphasised with diminuendo and ritardando in both performances. SR highlights the changes of tonal centres of V-IV in bars 66-67 with a clear articulation in the right hand, and a left hand transitionary chromatic passage, F2/1-E2/1-D#2/1-C2/1 in bar 69, which links the F# minor chord to B^7, is articulated heavily. SR's articulation is effectively projected in both performances, which supports the cello's melodic line. MR places a hurried rubato in both performances on the G#4-G4-F#4 in bars 74-75, which links to the tonal centres II#-IV#. The deceptive cadence in bar 77 is highlighted with

diminuendo, with very little tempo modification in either performance.

The G major arpeggio in bars 80-81, which acts as a leading role in returning to the F major in bar 82, is executed in a small scale ritardando in the 1950 performance. A scale of musical expression is exaggerated with a slight pause at the beginning of the third beat in bar 81 in the 1955 performance. The HC in bar 89 and the DC in bar 93 are emphasised with diminuendo and ritardando in both performances and bow stroke and pizzicato in bars 90-91 are executed in a steady tempo. The C^7 chord and dominant of F in bars 92-93 are played with a ritardando, which prepares the return of the thematic idea (a). The piano's final F major arpeggio is highlighted with a hurried rubato, which reaches the F major tonic with the cello pizzicato.

With reference to expressive dynamics, the artists correspond to the composer's marking of dynamics in both the 1950 première and 1955 studio recording, though a certain degree of variance might exist. As indicated in Figure 6.2, the expressive dynamics of bars 50-93 indicated with the pattern of curves in the two panes suggest a fair similarity between the two.

In general, the première performance shows a wider range of tempo and dynamic modifications than the 1955 recording. The première concert of the sonata can be suggested to show a spontaneous side of the artists, compared to the refined version of the 1955 studio recording.

- **Similarity of timing fluctuation**

The correlation of expressive timing between the two renditions of 1950 and 1955 is $r = 0.84$, $p < 0.0000001$ indicating that the timing fluctuation rate between the two is strikingly similar. As the expressive timing of the two renditions indicates a striking similarity, the average reading of expressive timing in Rostropovich's two renditions is compared with the two other renditions, the French cellist Navarra's 1958 recording and Yo-Yo Ma's 1990 one. Both Navarra's and Ma's expressive timing is similar to Rostropovich's (Navarra: $r = 0.76$, $p < 0.0000001$; Ma: $r = 0.72$, $p < 0.0000001$).

- **Motive and performance**

Chromatic language has been the most heated topic of Prokofiev studies (e.g. Minturn 1997; Rifkin 2004), although the ways in which Prokofiev's chromaticism is executed in performance practice has received little scholarly attention. That is, Woodley's 1995 study

(mentioned earlier in Chapter 1) appears to be the only work that tackles issues in the structural irony of Prokofiev's op.80 violin sonata in relation to performance practice. Due to Prokofiev's tendency to repeat thematic ideas[78] in writing the cello sonata, identical motives can often be found, which makes an interesting observational point for performance. To identify the ways in which performances are shaped, motivic identification could be used to distinguish repetition that creates hierarchical relationships.

At this point, I consider how the chromatic motive in bars 3-4 is executed with expressive timing and dynamics and its reoccurrence in bars 9-10, 37-38, 96-97 and 106-107 (see Table 6.4).

Table 6.4. Expressive timing and dynamics in the chromatic motive in bars 3-4

Duo	IOIs; loudness	*r*	*p*
Rostropovich/Richter (1950)	b3-4	0.06	0.41
	b9-10	-0.27	0.15
	b37-8	0.01	0.48
	b96-7	0.03	0.45
	b107-8	-0.14	0.3
Rostropovich/Richter (1955)	b3-4	-0.03	0.45
	b9-10	-0.37	0.07
	b37-8	0.39	0.06
	b96-7	0.01	0.48
	b107-8	0.26	0.16
Ma/Ax	b3-4	0.05	0.42
	b9-10	0.09	0.37
	b37-8	0.15	0.28
	b96-7	0.11	0.34
	b107-8	0.14	0.3

In both the 1950 and 1955 recordings, the Rostropovich/Richter duo applies diminuendo towards the ending of the motive without any tempo modification. In the 1955 recording, whilst the motive in bars 37-8 is played with diminuendo and a slight slowing, the motive in bars 96-7 is executed with diminuendo, with forwarding movement of tempo gesture. The Ma/Ax duo phrases the motive crescendi, accompanied.

[78] According to Deborah Rifkin, due to the combination of 'traditional and 20th-century sounds', Prokofiev's music has been studied using both tonal and nontonal analytic techniques; i.e. Schenkerian and set-theoretical approaches (e.g. Neil Minturn's 1997 study). By '20th-century sounds', Rifkin means chromatic expression in Prokofiev's music, which can be seen as 'out of context' and has therefore been called 'wrong notes' in Prokofiev.

Moving on to another chromatic motive with a tonal function II-V of Bb, the E3 in bar 52 appears to be used as a leading-tone to the F3 in bar 53 in the Eb3-E3 in bar 52- F3 in bar 53 linear progression and tonal function. This motive appears again in the middle register of bars 55-56, in the upper part of bars 63-65 in a higher register, Eb4-E4-F4 and in bars 87-89. The motive has identical harmony and contrapuntal properties throughout, but it is associated with a chromatic event. The motive appears in the piano in bars 52-53, and in the cello in bars 55-56, 63-65 and 87-89.

When the motive is in the piano, Richter does not highlight the motive Eb3-E3 in bar 52-F3 in bar 53 with the modification of musical expression in either performance. However, MR executes the motive in bars 55-56, 63-65 and 87-89 by taking a slight diminuendo in the E3, so that F2-F3 in the bars is highlighted with a large crescendo. In other words, Rostropovich and Richter shape the motive independently from each other.

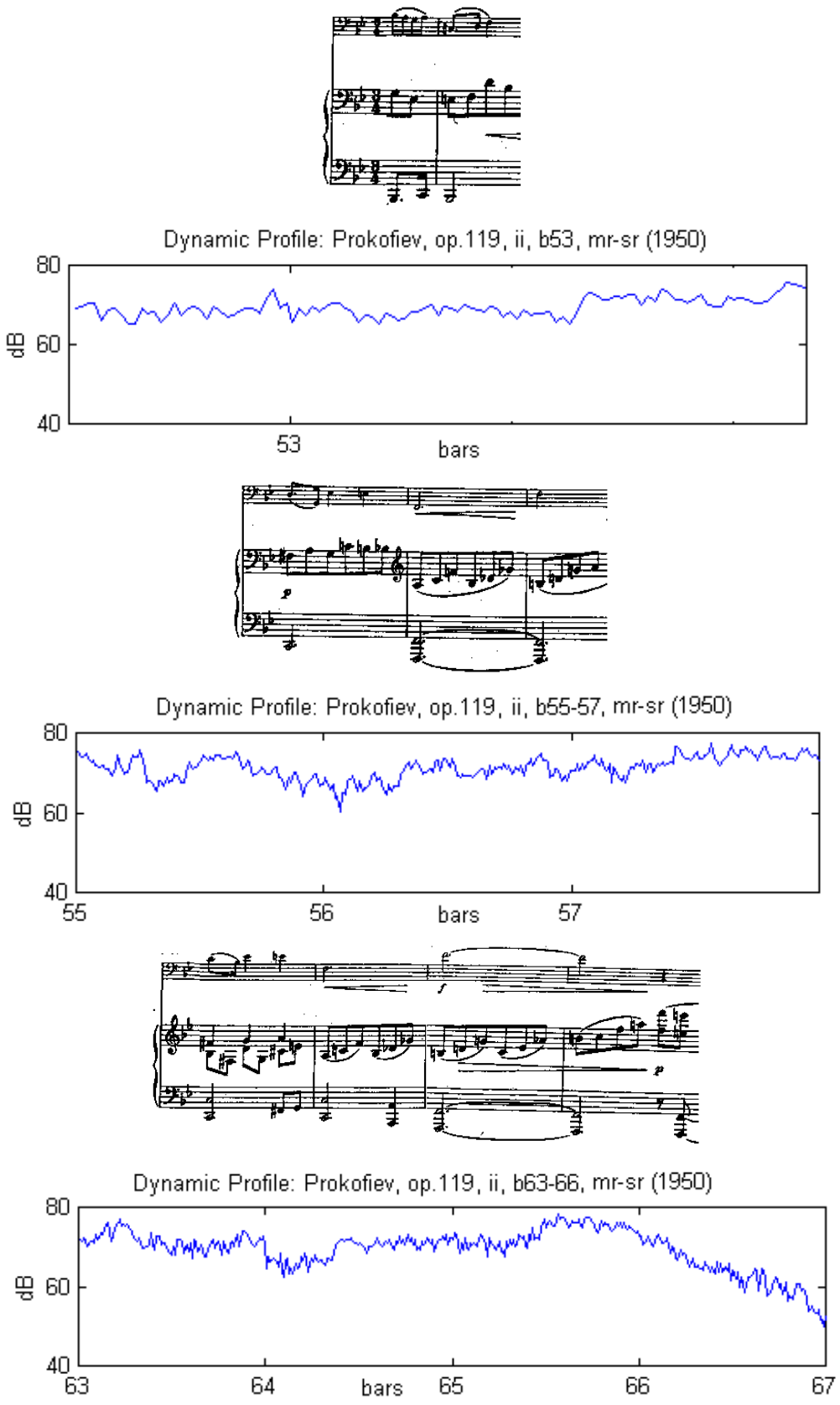


Figure 6.3. Performing motives in bars 53, 55-57 and 63-66: 1950 Rostropovich

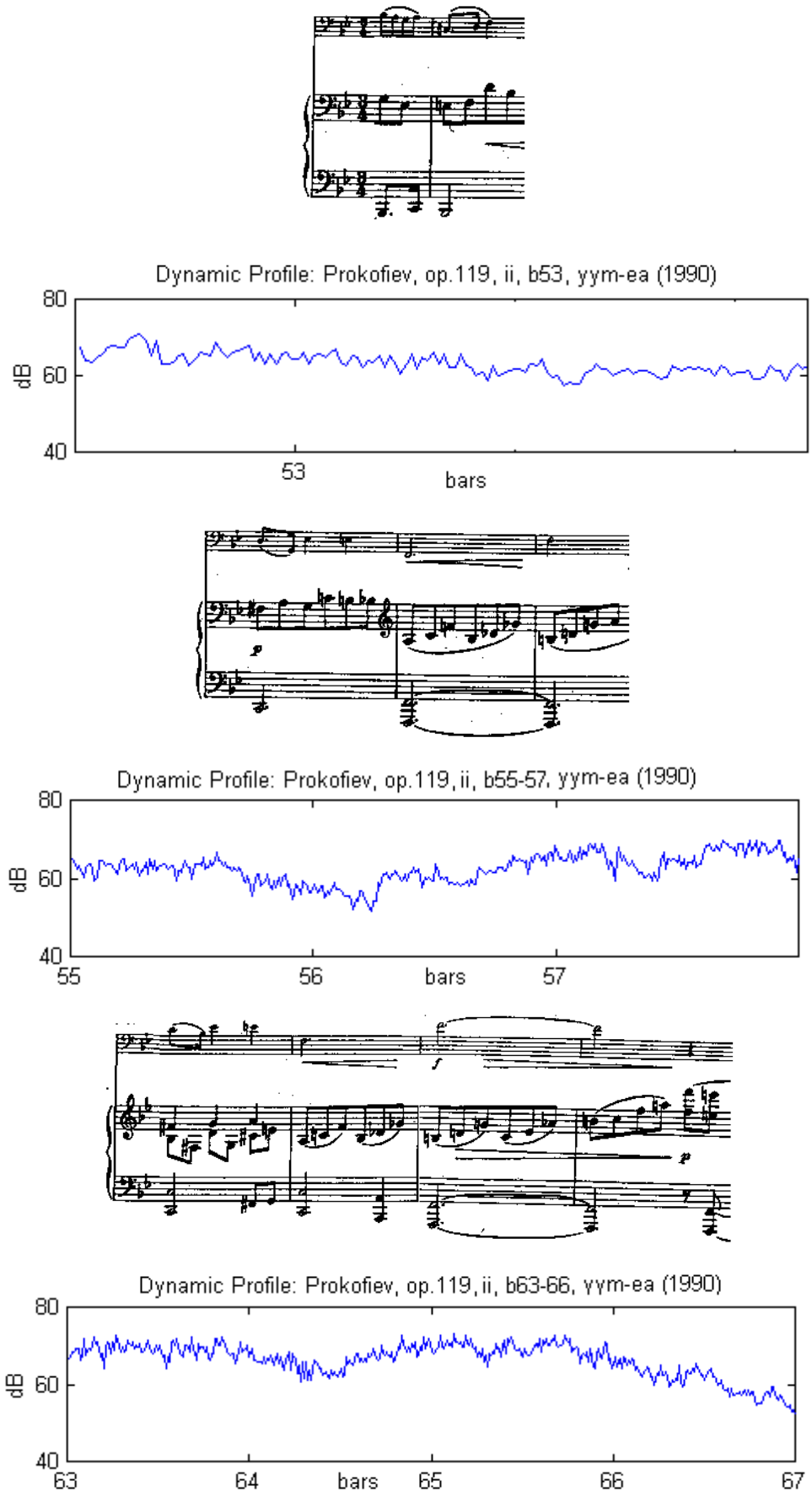


Figure 6.4. Performing motives in bars 53, 55-57 and 63-66: 1990 Yo-Yo Ma

In the Ma/Ax duo (see Figure 6.4), the motive Eb3-E3 in bar 52-F3 in bar 53 is highlighted effectively, when it occurs both in the piano and cello. That is to say, both Ax and Ma execute the motive in bars 52-53, 55-56, 63-65 and 87-89 by taking a slight diminuendo in the E3, so that F2-F3 in the bars is highlighted with a large crescendo.

To sum up, both the Rostropovich/Richter and Ma/Ax duos execute the chromatic motive in bars 3-4 and its reoccurrence that expressive timing and dynamics are unrelated to each other, such as diminuendo with a slight forwarding tempo or crescendo with slowing down. With regard to the shaping of the motive in bars 52-53 between instrumentalists, whilst Rostropovich and Richter shape motive independently from each other, the motive is shaped in a similar manner with a slight diminuendo and a large crescendo throughout, when it occurs both in the piano and cello of Ax and Ma. That is, Richter does not play the motive in bar 52 with a few modifications in both expressive timing and dynamics, whereas Rostropovich shapes the motive by taking a slight diminuendo and a large crescendo.

- **Summary**

In both renditions by Rostropovich and Richter, the cheerful opening and ending are executed intelligently with a brilliant display of various cello techniques such as multiple stopping pizzicato, bouncy string crossing, descending chromatic scales in double stopping and harmonics. The style of Rostropovich's expressive timing and dynamics in performing the second movement of Prokofiev's cello sonata op.119 remains similar between the première and the studio recording five years later. Similarity between the two renditions has been found in the overall tempo, phrasing, the correlation of timing fluctuations and the shape of motive, although some relative differences of expressive details are also perceived as a certain measure of flamboyancy in the première and rather reserved and sophisticated applications of musical expression in the second recording in 1955.

The following case study considers the performance styles of Prokofiev's "unfinished" solo cello sonata op.134, which Rostropovich never recorded in spite of his more involved collaborative role in the current format of the work.

6.3. Musical expression in Prokofiev's "unfinished" solo cello sonata renditions

Rostropovich played much more involved roles both in the planning stage of Prokofiev's "unfinished" solo cello sonata op.134[79] and the completion of the current format. The cellist, however, never recorded the sonata. I consider overall tempo and phrasing through expressive timing and dynamics.

- **Historical background of the "unfinished" solo cello sonata op.134**

According to Mira Mendelson-Prokofiev, (the composer's second wife who he married in 1948), Sergei Prokofiev planned the solo cello sonata op.134 as four movements in 1952 (Gutman 1990). Prokofiev was not only in failing health but he also continuously suffered the incomprehension of the Soviet musical authorities and had to bear the loss of his three closest friends, including the composer Nikolai Myaskovsky. Yet the devastating situation made his enthusiasm for the composition even stronger. Mira Mendelson-Prokofiev recalls that 'during the last months, all the forces his being could muster were tensed to write down as quickly as possible what he had planned. He worked on seven scores at once' (Gutman 1999). It can be suggested that Sergei Prokofiev perhaps knew that he also had little time left and therefore devoted all his remaining energy into the planning of his last few compositions. During this period, Mira was asked to add these seven new titles to the complete catalogue that Prokofiev had compiled in 1952.

Unfortunately, the composer had completed none of the seven works that he was working on by his sudden death in 1953, but the two works for cello, the concertino op.132 and the solo sonata op.134, appear "almost" complete amongst the seven "unfinished" compositions. The fact of being "unfinished" but "almost" completed provides a mixed suggestion. How far was it "unfinished"? The originally planned four movement solo cello sonata turns out as a single movement work. The material that survives relates to the sonata form first movement and Prokofiev had completed the movement up to about half-way through the development section and left sketches to indicate how the rest might proceed. With the help of Rostropovich, Vladimir Blok completed the current format of a single movement sonata in 1973.

Blok comments that a footnote in the manuscript indicates that "pages 1-4 of the sketches of the Sonata are the autograph, pages 5-7 written by Rostropovich under the direction of Prokofiev." M. Rostropovich confirmed the final conclusion in his letter to Blok:

[79] The "unfinished" composer's sketch later enters the concert repertoire.

"The last subject of the exposition of the first movement was written (notated) by me according to the sketches of Prokofiev. My writing stops on page 6 of the sketch on a double line (Tempo I). From this point onwards, the writing of Prokofiev himself starts again"[80].

The Sonata has not attracted any musicologists apart from a single comment from I. Nestyev, who wrote about this work as of a composition with "beautiful melodies". The first movement of the Sonata, Andante, starts from a lyrical thoughtful theme of a ballade type/style. The typical time signature of 6/8 and the "ballade" rhythm underline the expressive character of the melody. The second subject is based on a lively "conversation" of two melodic voices/lines. Its character reminds one of a scherzo in the style of the instrumental music of Scarlatti. Sketches of the first movement do exist. The peaceful and elegy-type character of the first theme of the Andante is shadowed by a rather contrasted second subject, but without any changes in the rhythmical character of the first theme.

On the front cover of the manuscript paper by Blok, it is noted that the solo cello sonata is op.133. Nevertheless, the solo sonata is under op.134 and another "unfinished" work, the concerto for two pianos and strings, is op.133 in the official catalogue of Prokofiev's works. Since both works remain "unfinished", it is also ambiguous which work should be categorised as op.133. Another intriguing aspect of the sonata is that according to the official catalogue (Gutman 1990), the sonata is in C# minor, whilst it is clearly in F# minor. It can be assumed that the intended key-scheme of the sonata could have been C# minor in the initial planning stage.

- **Investigated performances**

The completed current format of the sonata was given its première concert by the cellist Natalya Gutman[81] in Moscow in 1972. Steven Isserlis made the first recording of the work in 1989, which was followed by Alexander Ivashkin in 1996 and 2002 and Raphael Wallfisch in 1999. Table 6.4 introduces the recordings that are empirically investigated for the study. Given that the composer's sketch was available up to the exposition of the piece, performance analysis was also considered to the exposition.

It is also interesting how little attention the piece has received as concert repertoire. Given my own experience of the complications in obtaining the score, one possibility might be due to the difficulty of accessibility of the score, since it is still "unpublished".

[80] Translated from the Russian text.

[81] Given Rostropovich's collaborative involvement in the planning stage and the completion of the current format of the work, it appears rather peculiar to find that neither the sonata première was given by the cellist nor the sonata commercially recorded by him.

- **Overall tempo**

As indicated in Table 6.6, the overall tempo of the "unfinished" solo cello sonata renditions varies considerably. When measured in 2, Isserlis' tempo is about 75. Ivashkin's 1996 rendition is similar to that of Isserlis, but Ivashkin's later recording is much faster, 114. Wallfisch's tempo is the fastest of all, marking 126.

Table 6.5. Overall tempo of the four renditions.

		Isserlis 1989	Ivashkin 1996	Wallfisch 1999	Ivashkin 2002
op.134	Exposition	75	77	126	114
op.119	[A]	105	100	104	105
	[B]	95	80	91	88
	[A]	111	103	110	112

Considering the similarity in the overall tempo in the op.119 renditions by the same cellists, it is interesting to note the varied overall tempo between the four renditions of the "unfinished" solo cello sonata. It can be suggested that given the "unpublished" status of the score, each cellist might have set himself as a pioneering interpreter of the repertoire, rather than seeking and following the culturally accepted tempo.

- **Phrasing in performance**

At this point, I consider how phrases are structured and how boundaries are shaped in the average timing patterns of the four performances (see Table 6.7).

Table 6.6. Expressive timing in phrase boundaries

Phrase	Grouping	Boundary	Timing
b1 - b6 (1)	A + B + A	f#: VI - IV	rushed
b6 (2) - b12	A + C + C + A + A	c#: VI - I	*rit*
b13 - b20 (1)	A+ B + A + A	f# I - IV	*rit*
b20 (2) - b25 (1)	D + B	f#: IV - I	*rit*
b25 (2) - b32 (1)	A + B	f#: I - VI	rushed
b32 (2) - b40	A + D + A	f#: V - Bb: I	*rit*
b41 - b48 (1)	A + C + C + A	e: I - V	rushed
b48 (2) - b53	B + B + A	a: I - IV	*rit*
b54 - b60 (1)	C + C + A	e: I - V	*acc*
b60 (2) - b65	B + B + A	a: I - IV	*rit*

b66 - b77	C+ C + C + C + A + A	f#: III - D: I	*rit*

Grouping structure indicates the ways in which phrases are structured with reference to paradigmatic analysis. The principle of segmentation is often based on (1) rhythmic identity and (2) the shape of melodic motive. The segmentation paradigms bases are as follows: Paradigm A is units that involve a rhythmic pattern  or its modified versions. Ascending melodic motives are segmented to units in Paradigm B, in which the segmentative decision is based on the overall shapes rather than individual details. The melodic shape of units in Paradigm C begins with descending-ascending-descending (\ / \ ), which also consists of repeated rhythmic motives, and detached two-quavers followed by slurred three-quavers or their equivalent rhythmic value. Units that begin with a set of detached quavers, in which melodic shapes are the combination of ascending/descending, are segmented in Paradigm D.

Phrases are divided into five to ten bars, according to cadential point and/or the ending of melodic ideas. The first phrase is structured with ABA. The remaining phrases can be suggested to be a modified version of the first phrase. For instance, it can be seen that the 'CC' and 'AA' replace the 'B' and 'A' respectively in the case of the second phrase. The third phrase, ABAA, serves as the transposition of the first phrase with an additional 'A', whereas the fifth, AB, can be suggested as another transposition of the first one without the final 'A', and so on.

I also make a brief note on how phrasing boundaries in the four renditions are generally shaped. The first phrase boundary is found at the first beat of bar 6, as a new melodic motive begins, where the timing pattern of this point in the performance becomes rushed. Nevertheless, since it is the progression of sub-mediant to sub-dominant (VI – IV), it is unclear whether this should be considered as a cadential point. The second phrase ends with the sub-mediant-tonic, VI – I, of C# diatonic minor at bar 12; the C# minor cadential point in bar 12 is marked with ritardando.

The third phrase boundary is at the first beat of bar 20, in F# minor tonic to subdominant, I – IV. Although it is also unclear whether it should be considered as a cadential point, the third phrase also slows down. The fourth phrase closes at the first beat of bar 25, the sub-dominant to tonic, IV – I, of F# minor, which is emphasised with ritardando. The fourth can be seen as the modified version of the first phrase, because it shares the same second unit, B. The fifth phrase ends at the first beat of bar 32, the tonic to sub-mediant, I –

VI, of F# minor. As occurs in a similar harmonic progression in the first phrase, the timing pattern becomes rushed. The sixth phrase ends at bar 40 in perfect cadence of the dominant, V, of F# minor – tonic, I, of Bb major, which is expressed with slowing down. The sixth phrase begins and ends with the 'A', as in the first phrase.

The seventh phrase boundary is at the first beat of bar 48, which makes the half cadence, since the E minor tonic moves to the dominant. The half cadence becomes rushed in performances. The seventh phrase serves as a transposition of the second phrase. The eighth phrase ends in bar 53 with the A minor tonic – subdominant progression, which is emphasised with ritardando. The 'B' replaces the 'A' in the eighth phrase, which makes the 'BBA'.

The ninth and tenth phrases are transpositions of the seventh and eighth phrases respectively. Likewise, timing patterns also become faster at the boundary of the ninth and slow down at the tenth. The eleventh phrase, an extended version of the ninth phrase, concludes the exposition of the sonata with the F# minor- D major progression, which is marked with ritardando.

- **Timing fluctuation in performances**

Moving on to consider the expressive timing of the four performances with reference to phrase boundary, Figure 6.4 illustrates timing fluctuation in the exposition, bars 1-77, of the sonata.

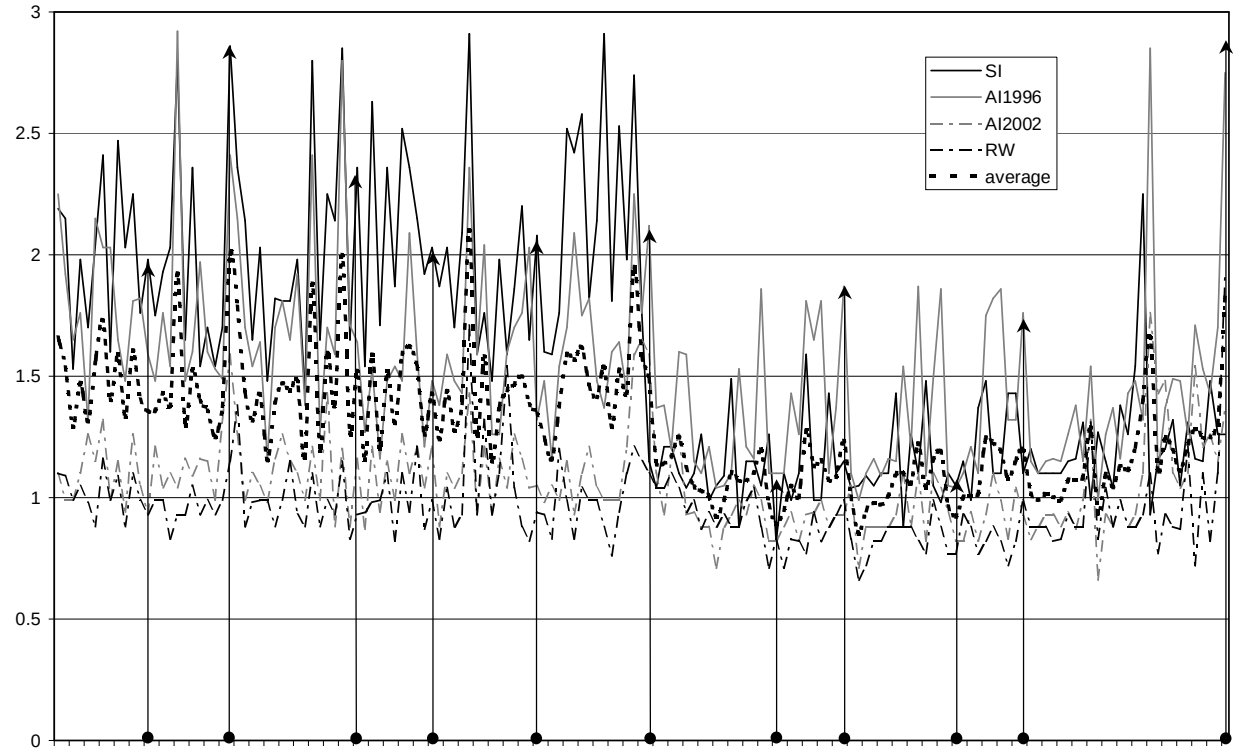


Figure 6.3. Expressive timing of the four performances and their average

The lines of different shades of grey indicate the timing fluctuations of the four performances respectively and the average reading of the four. The duration is plotted using seconds and therefore the plotted line indicates that the longer the duration, the higher the plotted line. The arrows in the figure indicate phrase boundaries.

In both renditions, AI's tempo is slow up to bar 40, then his tempo picks up from bar 41. Given that the climax of bars 1-40 in expressive timing by SI and RW appears as the melodically highest point in F# harmonic minor in bar 17, the third phrase appears to be the re-statement of the opening section in their rendition. The third phrase, however, does not appear as an interesting section in motivic analysis, because units in Paradigm A dominate the phrase. The following fourth phrase can also be seen as a noticeable section from a paradigmatical point of view, because it is the least corresponding phrase in the structure. In contrast to SI and RW's renditions, AI considers the fourth phrase significantly, where the sense of losing direction can be perceived.

Execution styles of phrase boundary appear similar to each other in either perfect or half cadences. In AI's phrase boundaries, the dynamics shaping is mostly accompanied by the corresponding tempo gesture, such as crescendo with rushing-up and diminuendo with slowing-down. In most cases, SI and RW highlight boundaries with expressive dynamics

rather than using rubato. The sub-mediant phrase boundary in bar 12, tonic progression of the C# diatonic minor, is executed with hurrying in all the four performances. AI slows down at the second beat of bar 12, VI – I of C# minor, which could suggest that he might have perceived bar 13 as a phrase boundary, whereas RW slows down from the second beat of bar 12 towards the first beat of bar 13. AI places diminuendo towards the C#2 in bar 12 from the immediate previous pitch G#2, whereas RW's scale of diminuendo is large and gradual, since it begins from the A2 in bar 12. SI and RW take time and pause on the first beat of bar 20, where the tonic moves to the sub dominant of F# minor. But in AI's case, this point is executed in an opposite manner to RW's shaping with a rush. Large-scale ritardando with a gradual diminuendo and pause take place in bar 40, perfect cadence, in all four renditions. The half cadence of tonic – dominant of A minor at the first beat of bars 48 and 60 is also executed with ritardando and a gradual diminuendo.

- **Similarity in timing fluctuation of the four renditions**

Similarities in tempo variation were calculated using Pearson's *r*. For the absolute modulation up to the exposition, the standard deviation and the average of the tempo data of the four performances correlate positively ($r = 0.98$, $p = 0.01$). For the relative modulation in the movement, I calculate the standard deviation divided by the mean and the average of the tempo data of the four performances, which indicates positive correlation ($r = 0.96$, $p = 0.03$). That is, both absolute (literal level) and relative (in relation to all the investigated performances) measures of the timing modulations are large in the overall structure of the movement.

Correlation between the timing fluctuation of individual performances was computed in relation to the average reading. SI's expressive timing correlates closely to the average reading ($r = 0.81$, $p < 0.0000001$) and AI's first performance in 1996 corresponds to the average reading of timing fluctuation and is also strongly similar ($r = 0.81$, $p < 0.0000001$). AI's second rendition in 2002 is also similar to the average reading ($r = 0.7$, $p < 0.0000001$), although not as similar to his earlier rendition. The similarity rate between the average reading and RW's expressive timing ($r = 0.63$, $p < 0.0000001$) is relatively weak amongst the four.

- **Summary**

The overall tempo and expressive timing of the "unfinished" solo cello sonata renditions vary

between the Moderato versions of Isserlis and Ivashkin’s 1996 recording and the fast versions of Wallfisch and Ivashkin's 2002 recording. This shows an example of Rostropovich’s contribution towards Prokofiev’s mere sketch, in that it could be shaped in the context of performance practice.

6.4. Rostropovich's Prokofiev

In spite of an indication of the flamboyant side of the artists in the 1950 première and a refined version in the 1955 recording, the artistic style of Rostropovich's musical expression in the two renditions of Prokofiev's cello sonata op.119 suggests a strong similarity between them over the five year interval. Judging from the fact that the overall tempo of the 1955 rendition is slightly slower than the première, it can be assumed that having performed the sonata at the première, the cellist found a more comfortable tempo in the studio version of 1955. Although the première performance shows a wider range of tempo and dynamic modifications than the 1955 recording, phrase boundaries in the two renditions by Rostropovich are shaped similarly to each other. The correlation of expressive timing between the two renditions of 1950 and 1955 indicates that the consistency in timing fluctuation between the two is striking.

Returning to the research question arising in the concluding part of the previous chapter concerning Brahms performance trends, another example of similarity between Rostropovich and other investigated cellists has also been found in the Prokofiev case study. That is, whilst the overall tempo of the younger generation such as Navarra, Isserlis and Ivashkin is similar to Rostropovich's 1955 recording, Rostropovich's marking (such as metronome marks) is followed more religiously by the younger generation, such as Ma and Ivashkin, than by Rostropovich himself.

This study has also shown how the cellist's collaborative artistic work sees light in the context of performance practice on record through an empirical investigation into the shape of the four available renditions of Prokofiev's "unfinished" solo cello sonata op.134.

Given how a sense of spontaneity in the première and a feeling of stability in the studio recording exist within the statistically proven similar interpretations, the cellist's performance aesthetics might lie within his own words, on how he "draws the truth from the composer's music" (Samuel 1983: 176). Rostropovich's musical expression on record could be suggested to have impact on the younger generation of artists due to a combination of three aspects: his collaborative roles in the cello music of the 20th century, his respect for the score and his constant style of virtuosity.

Chapter 7

Conclusion

In this thesis, it has been shown how recorded cello performance styles changed over the course of the 20th century, with particular reference to works by Brahms, J.S.Bach and Prokofiev. To conclude, I consider how the objectives stated at the beginning of thesis have been met in the empirical approach to musical expression in cello performance on record and what future implications could be suggested through this study.

In this thesis, it has been shown how recorded cello performance styles changed over the course of the 20th century, with particular reference to works by Brahms, J.S.Bach and Prokofiev. To conclude, I consider how the objectives stated at the beginning of thesis have been met in the empirical approach to musical expression in cello performance on record and what future implications could be suggested through this study.

With regard to the reception trends of recordings, this study has shown that changes of focus between the work-oriented and performance-oriented occur when musical works become recognised amongst critics; in the case of Brahms, it was in the 1950s, the Bach cello suite pre-WW2 and Prokofiev's cello music in the 1990s. Interpretative preference for romantic Bach or Brahms or for the classical versions is caused by landmark recordings: changing views of landmark recordings indicate how tastes and preferences have changed, whereas the remaining view of benchmark recordings indicates the significance of rendition itself in music history. For Brahms' cello sonatas, changing tastes in performance styles are revealed in each decade, whereas Casals' Bach and Rostropovich's Prokofiev were considered as the benchmark renditions throughout the 20th century. Appreciating or dismissing historical nuances could represent the social trends and expectations of the time.

With reference to the performance trends of Brahms, although data used in this study by no means represent the exclusive list of the repertoire, performance trends in the Brahms cello sonatas can be suggested to relate to five different aspects. The performance trends in the relative duration of the sonatas are related to historical aspects, such as the date of recording for the E minor sonata, whereas the relative duration of the F major is related to the structure of the music. Expressive timing in the case of multiple renditions by the same performers suggests that almost no similarity was discovered between any given two performances. However, pedagogical similarities in the same pedagogical lineage, such as the Rose line, were detected in the case of expressive timing. Whilst portamento analysis suggests some meaningful findings between cellists' age and portamento occurrences and/or slide speed and the vibrato of the E minor cello sonata in relation to the speed of vibrato and the date of recordings, vibrato does not show any meaningful correlation with any of the aspects examined in the case of the F major sonata.

Regarding the performance style of Casals' Bach, whilst his performances of Bach on record generally conform to his own performance aesthetics, there is no stylistic change in vibrato and portamento detected between his 1936 recording and 1954 footage. Changes in the overall tempi of the Prelude and Menuet, as well as correlation of note onset level rubato of the Sarabande and the Menuet, can be suggested to be interpretative alterations. It is

indeed true that the 1936 recording had brought “life” to the Bach cello suites by contributing to their acceptance as concert repertoire, and I add that the 1954 footage provided another classic insightful Bach. Likewise, in spite of an indication of the flamboyant side of the artists in the 1950 première and a refined version in the 1955 recording, the artistic style of Rostropovich’s musical expression in the two renditions of Prokofiev’s cello sonata op.119 suggests a strong similarity between them over the five year interval.

In the study of reception trends, it was noted that the increasing sense of history which comes through a longer time span (different formats) including HIP and early recordings by the time of 1990s. Implications for the future generation from this study include the suggestion that performers become more active in producing a blended style of the historical and the present, in addition to more research of performance history in an empirical approach.

- **Closing**

This study has presented original empirical findings on how recorded cello performance styles changed over the course of the 20th century, with particular reference to works by Brahms, J.S.Bach and Prokofiev. It has also indicated how reviews of these recordings changed over the same time scale. These changes are evidenced by the detailed empirical analyses of musical expression in selected cello recordings.

A number of important issues about musical expression in performance have been raised in the context of cello performance practice. The present empirical investigation reveals how precisely measured musical expression can play an effective role in detecting performance history. This thesis, through an empirical analysis of musical expression in the selected cello recordings, makes significant contributions to existing empirical scholarship on musical performance, because an essential level of objectivity has been brought to musicology based on empirically proven sets of data, in addition to a number of evidence-based issues which have also been identified in 20th-century cello performance on record. It is hoped that musicological understanding of empirical approaches to performance in general, and measurement of musical expression on record in particular, grow into a welcoming phase.

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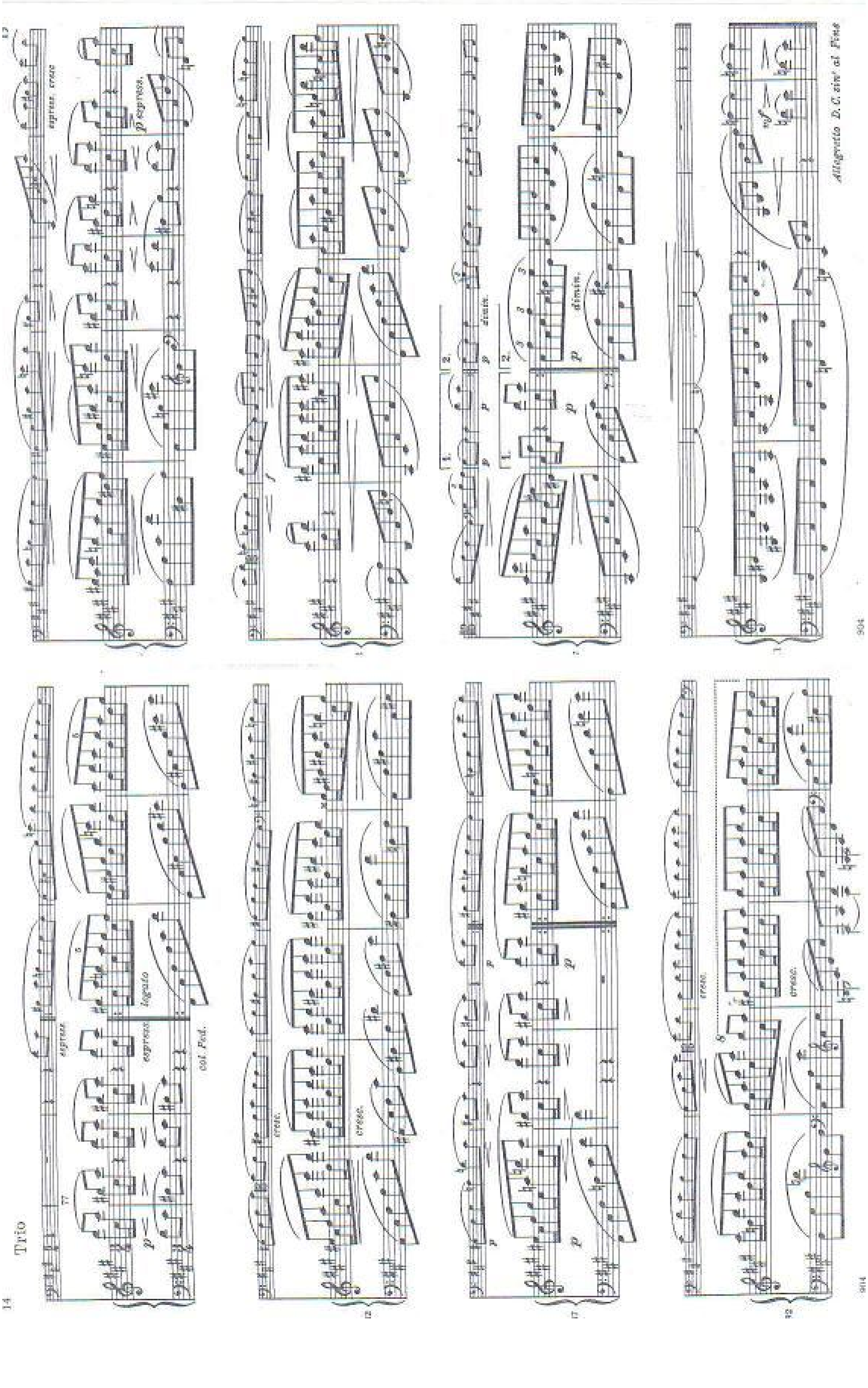
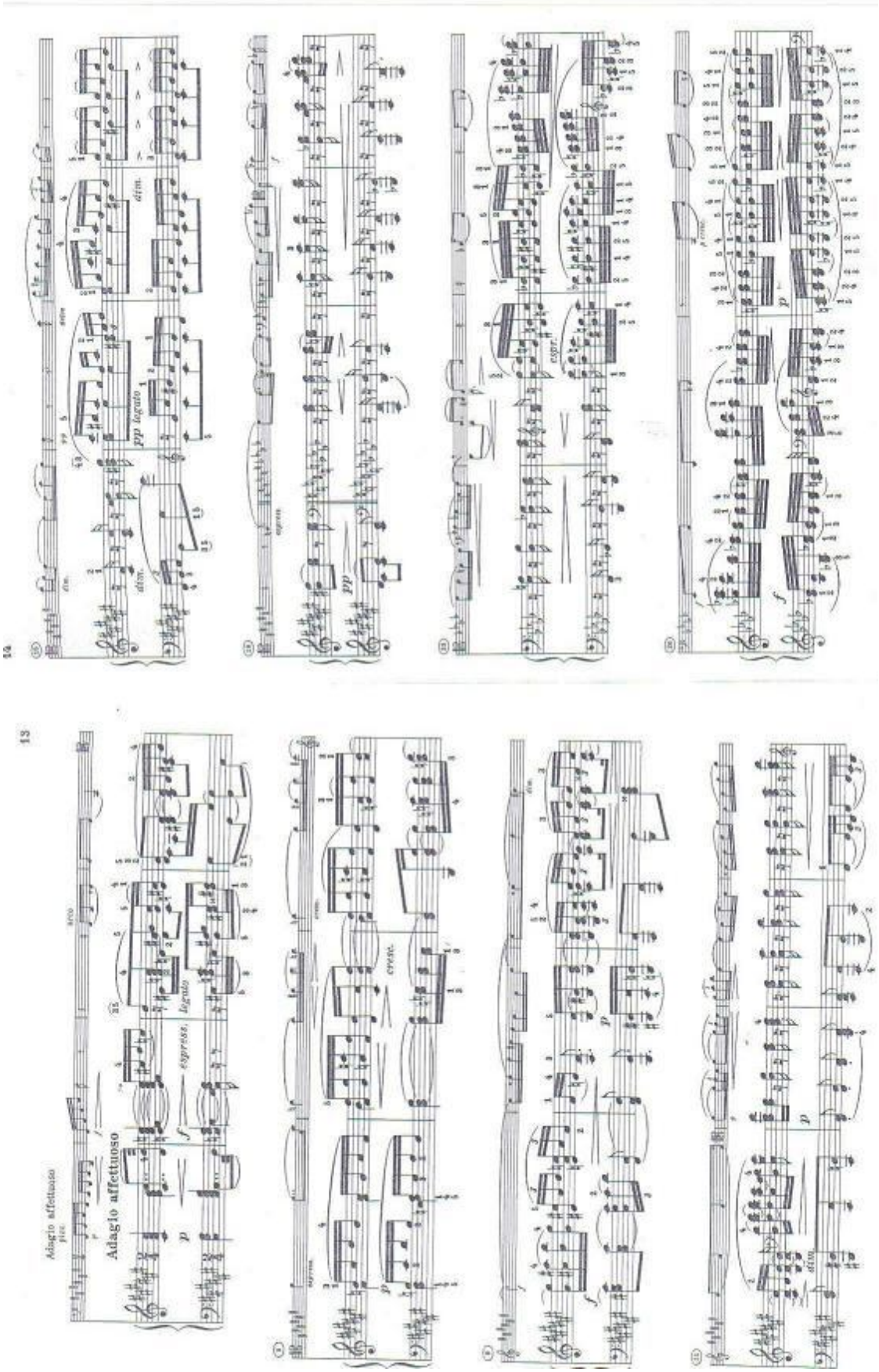
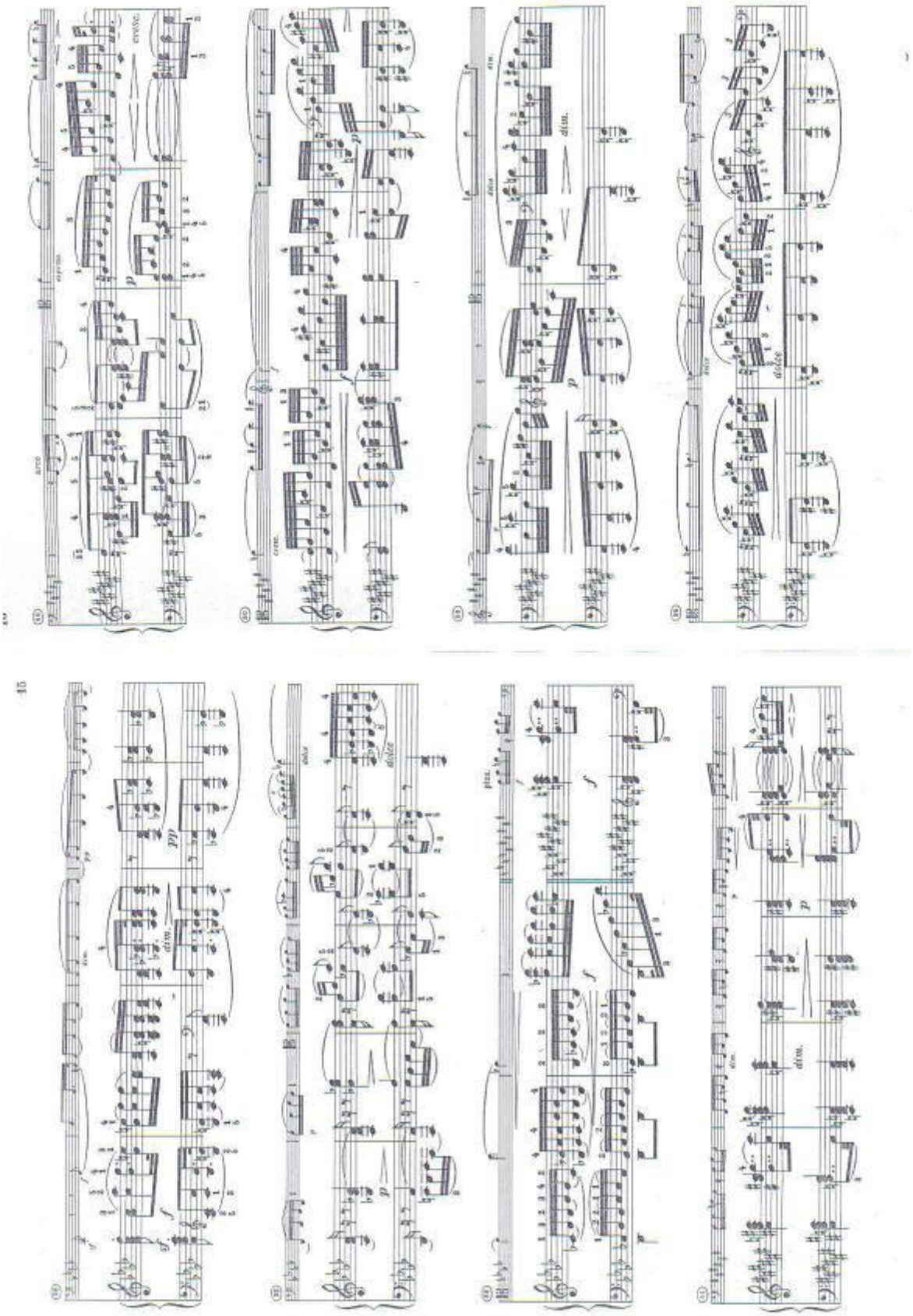
Appendix 4.1. The score: second movement of Brahms' e minor cello sonata, op.38

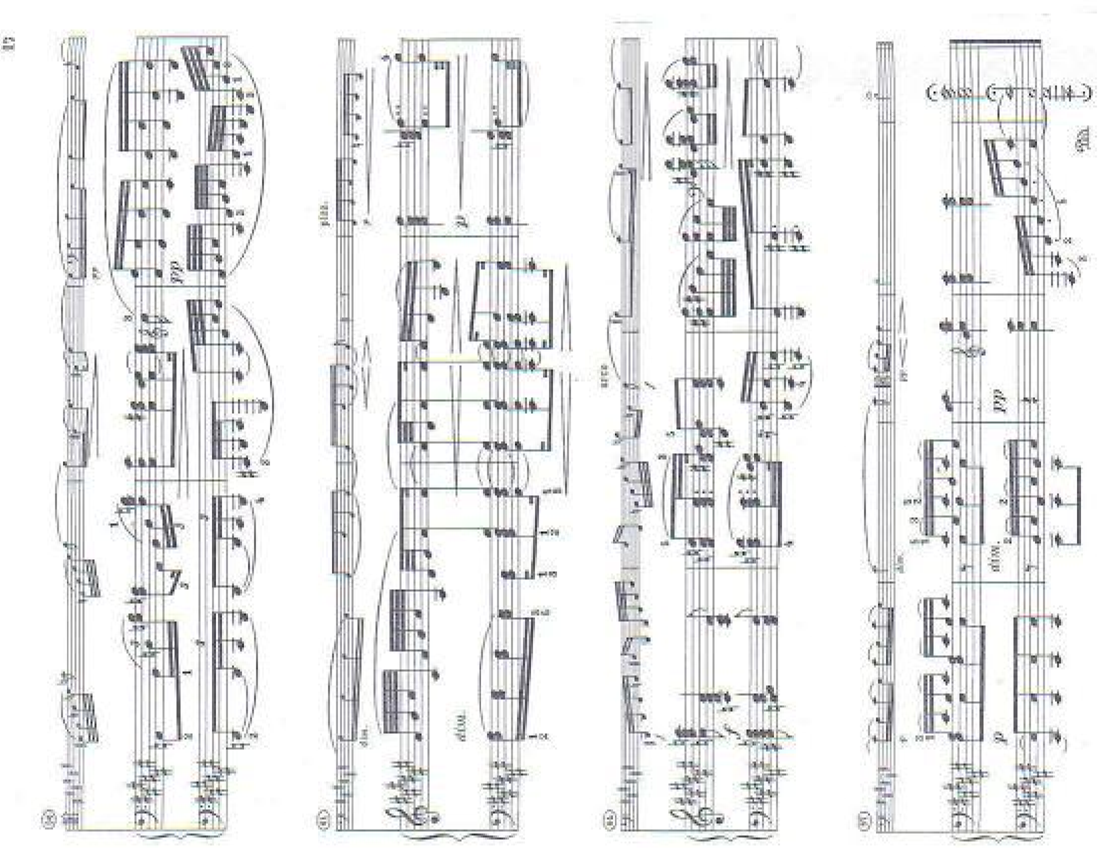

Allegretto quasi Menuetto
dolce
cresc. poco a poco
p grazioso
Fine


14
Trio
espress.
legato
col Ped.
cresc.
dimin.
Allegretto D.C. sin' al Fine

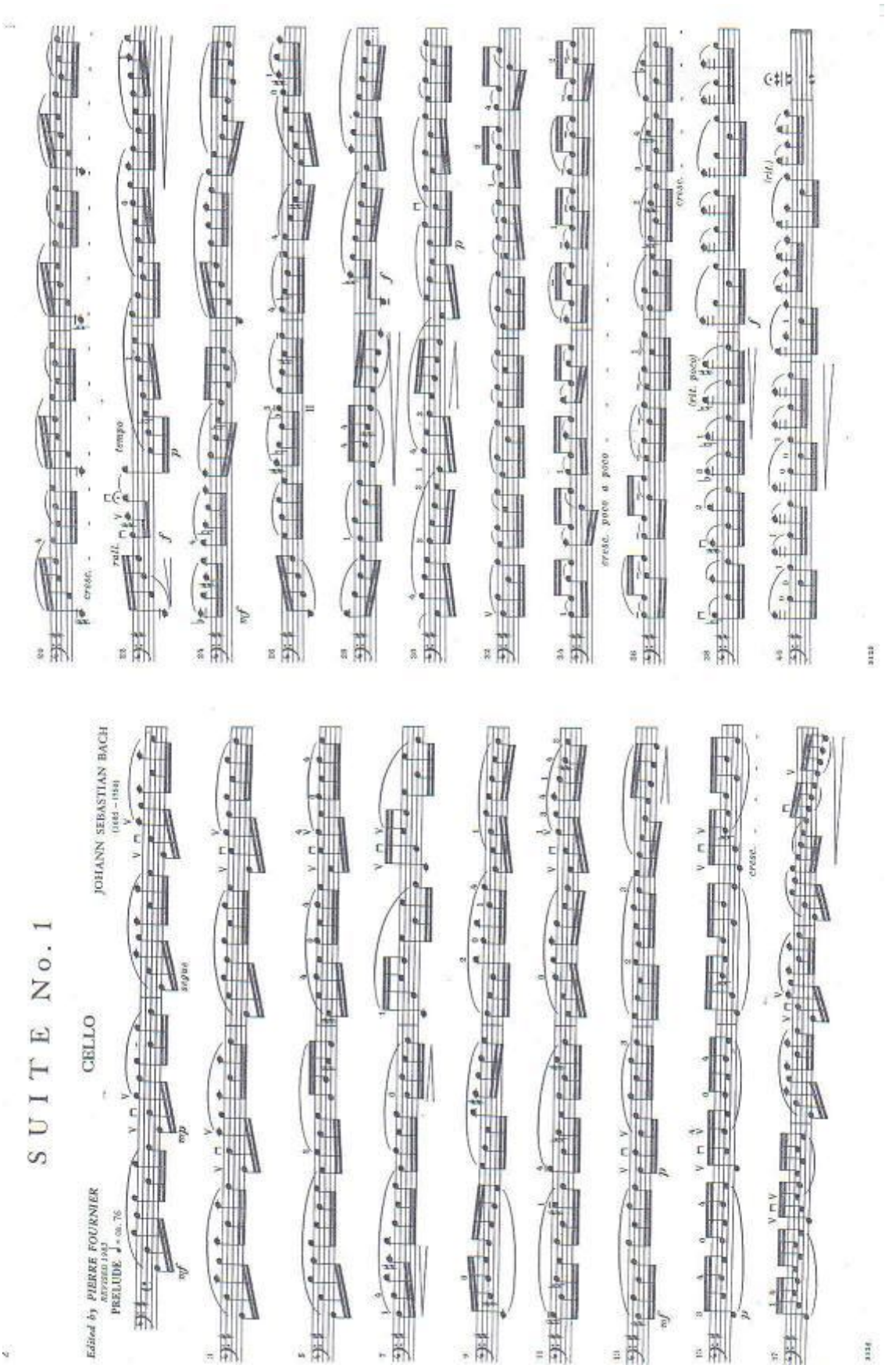
Appendix 4.2. The score: second movement of Brahms' F major cello sonata, op.99

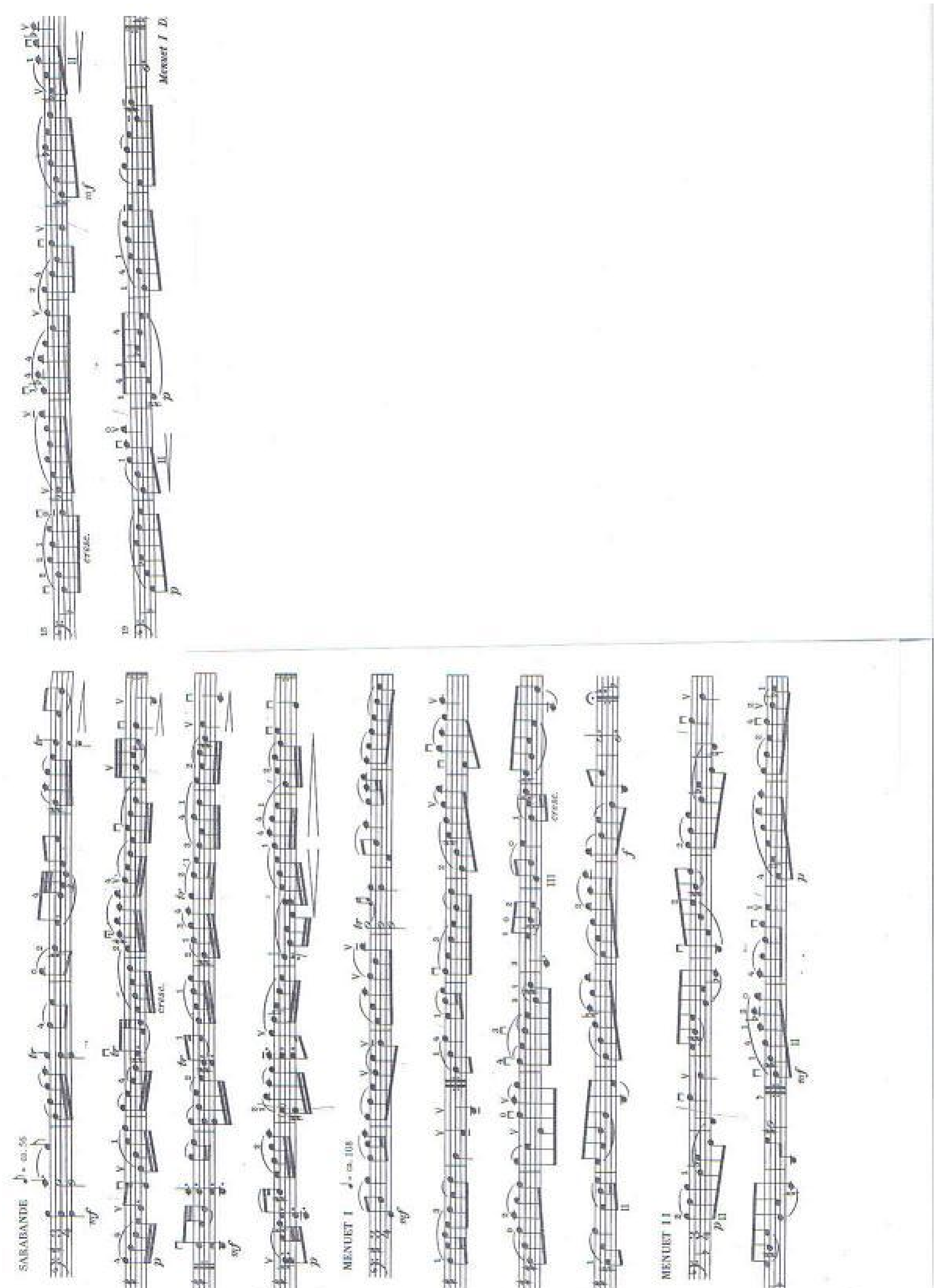




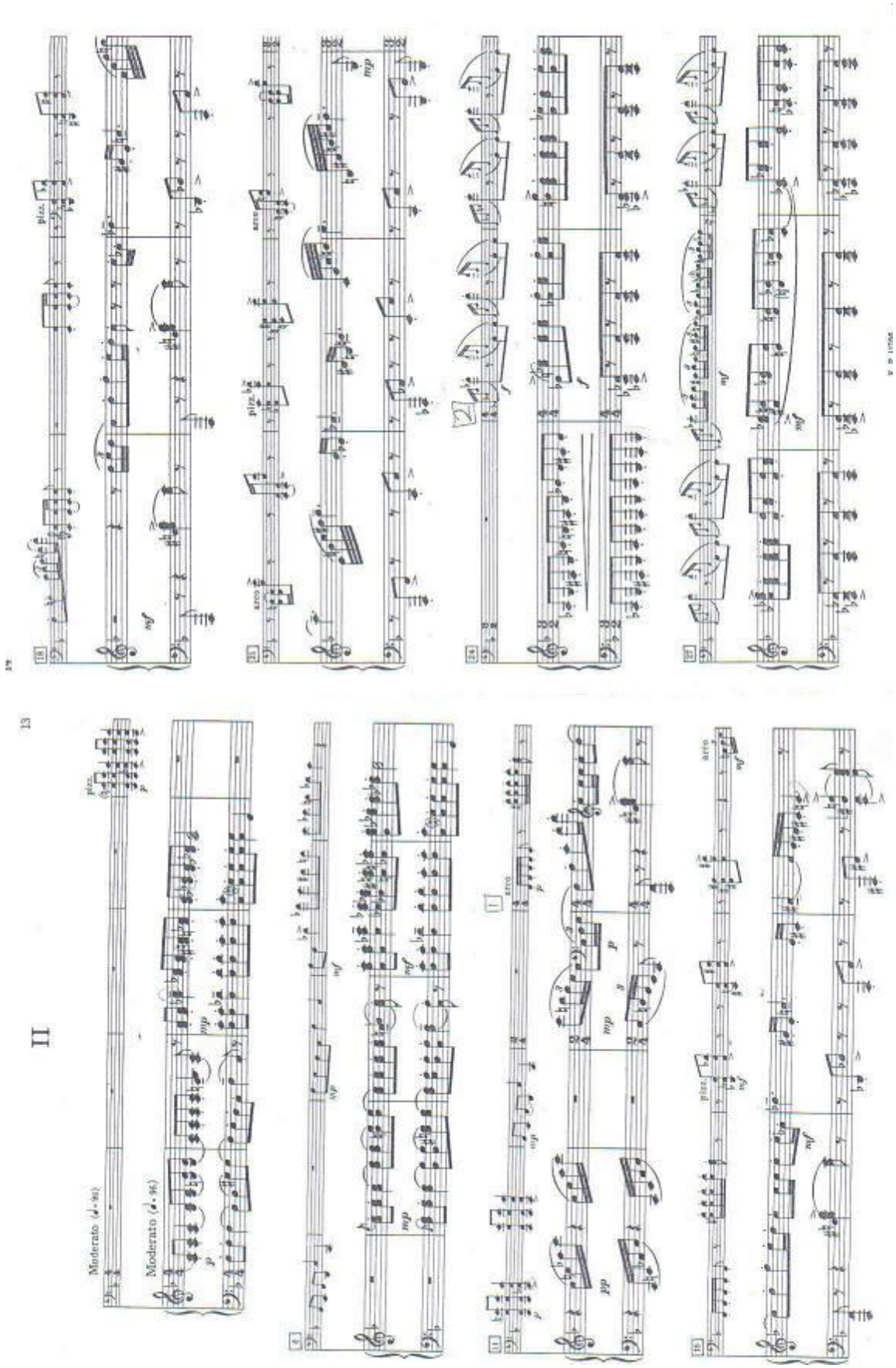


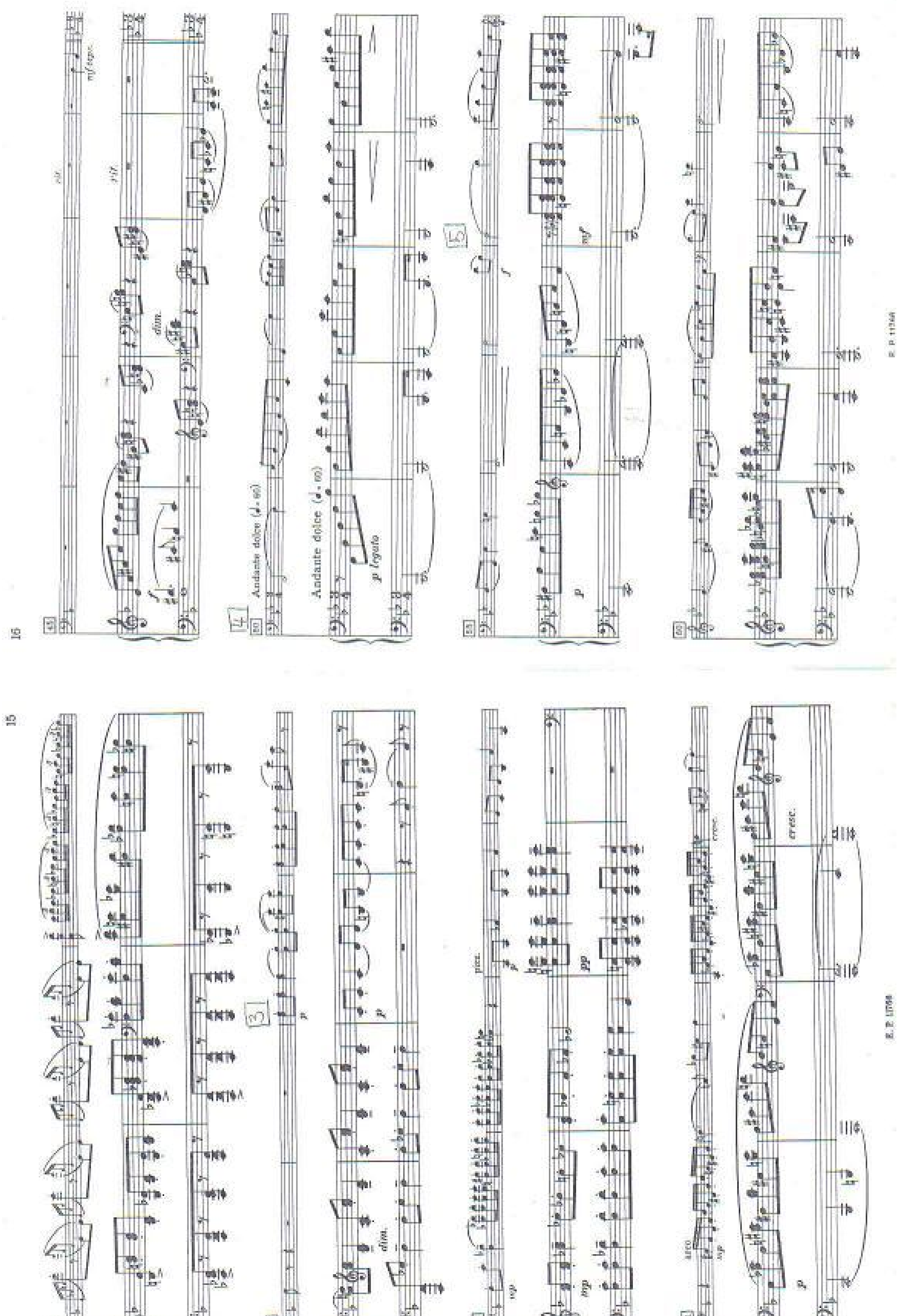
Appendix 5.1. The score: three movements of J.S.Bach's Cello suite BWV 1007

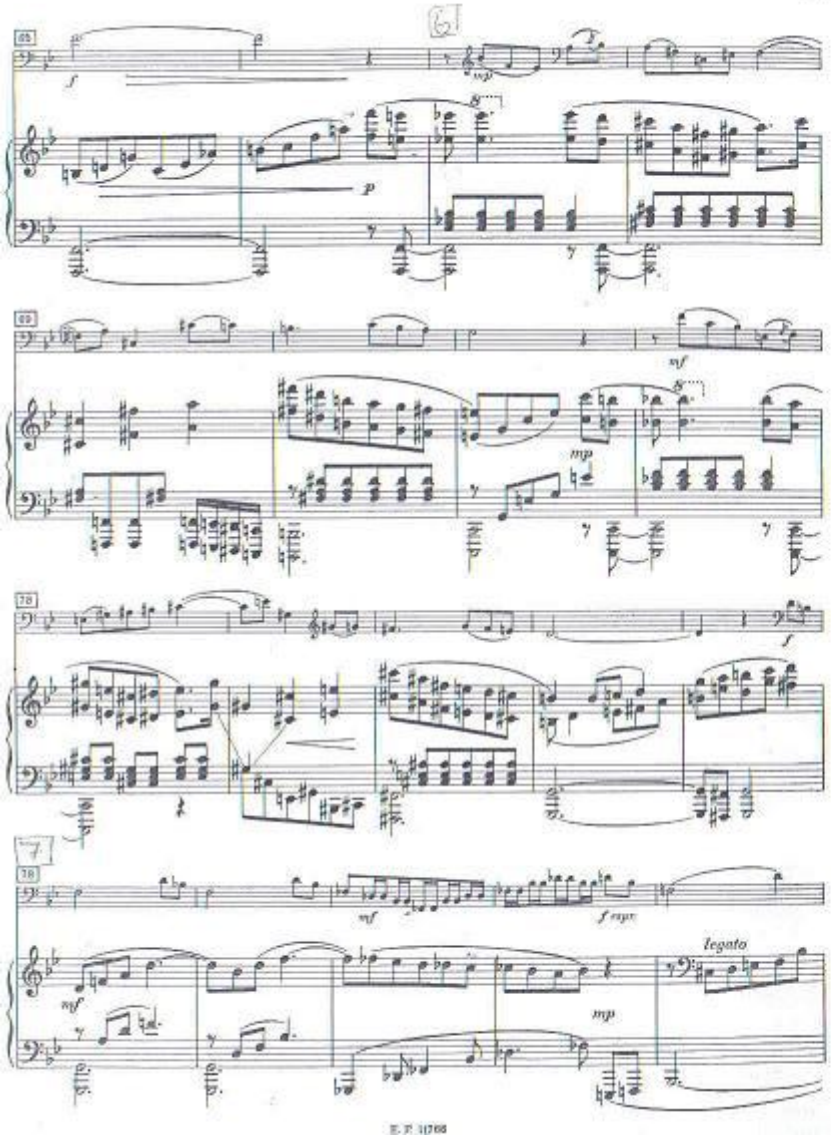



SARABANDE
cresc.
MENUET I
MENUET II
Menuet I D.C.

Appendix 6.1. The score: second movement of Prokofiev's cello sonata op.119



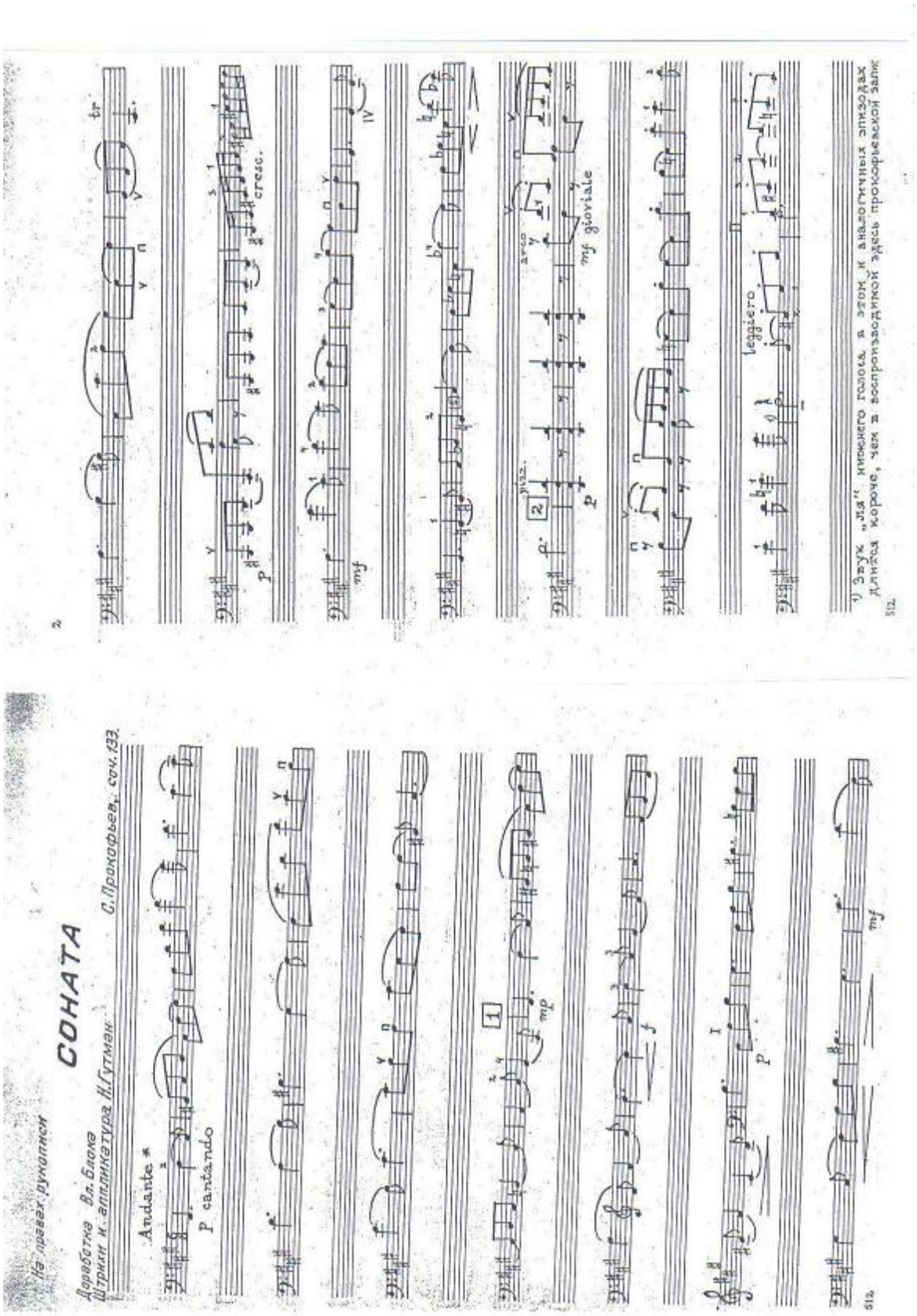

15
16
Andante dolce
p legato
dim.
cresc.
arco
pizz.

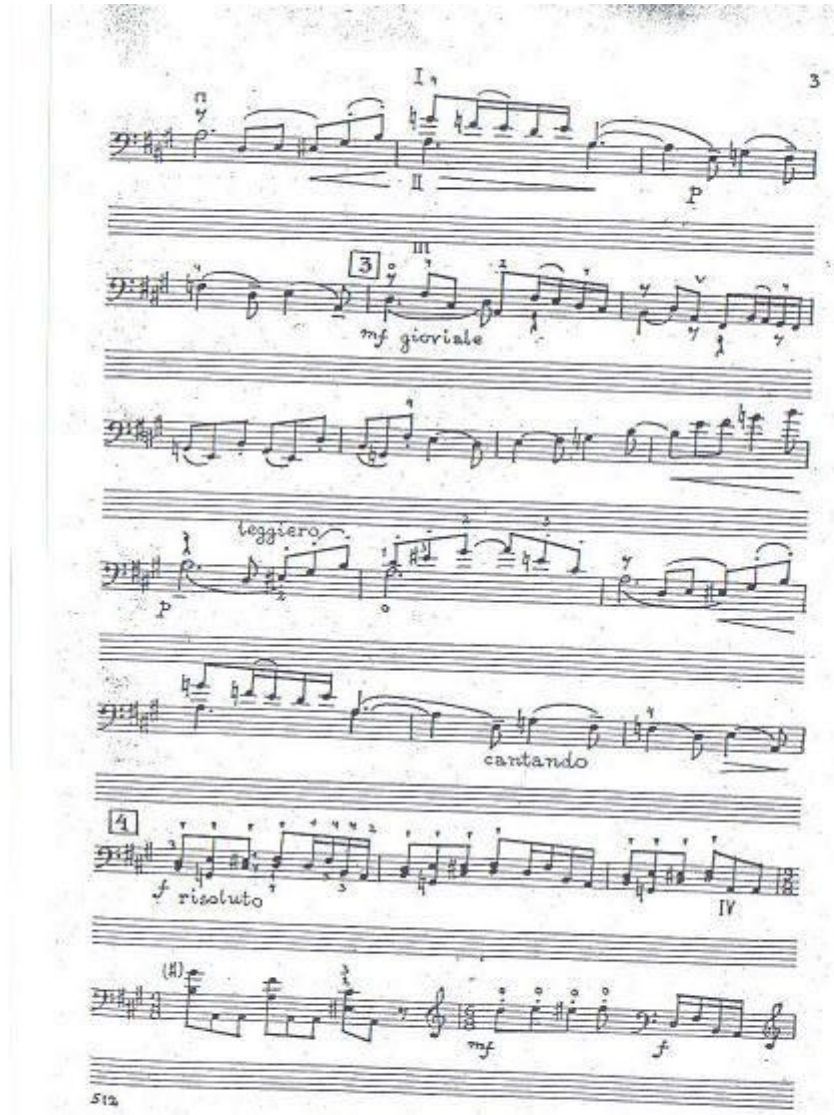

6
7
legato


cresc.
8
Moderato primo
Moderato primo


arco
mp
p
mf
pizz.
arco
f
mf
pizz.
mp
p
mp
mp
pp

Appendix 6.2. The score: Prokofiev's "unfinished" solo cello sonata op.134, Exposition




3
I
II
P
3
III
mf giocoso
leggiero
p
cantando
4
f risoluto
IV
(II)
mf
f
5/2


4
mf
f
mf
arco
pizz.
arco
pizz.
pizz.
f
dim.*
p*
5 Tempo I
arco
pp *
p * cantando