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Abstract

This paper continues a previous one which described performances of the Bourré I form the Suite No. 3 in C Major for Solo Cello by J. S. Bach, by Paul Casals, Pierre Fournier and Yo-Yo Ma. In this opportunity, two attributes of the micro structure of other by Maurice Gendrom, Mitslav Rostropovich y Paul Tortelier. The main goal of this is to describe the individual characteristiscs of the use of dynamics and timing in expressive performance. A proportion of deviation of the actual performance from the nominal value was obtained. These values were graphically represented as *profiles of expressive timing and dynamics.* A description of each of the selected performances is presented according to the following categories: relationship dynamic profile / timing profile; 2) Relation between both profiles and grouping structure (Lerdahl & Jackendoff, 1983); 3) Relation between both profiles and metrical structure; 4) Relation between both profiles and tonal structure (Prolongational Reduction, according to the voice leading principles (Schenker, [1935] – 1979). Data seem to indicate that both components tend either to compensate each other or to compensate other structural attributes. However, an observed non systematisation of this use, seems to account both of its unconscious nature, and its origin in the search for the homogeneity of the personal touch.

Introduction

Expressive performance can be described in terms of its microstructure (CLYNES 1983). It includes a series of variations of timing, dynamics, articulations, intonation, vibrato, timbre, etc. These variations are frequently expressed as minimal percentage of standard values established by a given norm by which typical performances are governed. Timing and dynamics are the most universal components of microstructure manifested in most of music performances.

TODD (1992) proposed a computational model of musical dynamics complementing another one of timing (TODD 1985), predicting a general dynamic shaping fitting to the *crescendo/diminuendo* pattern. This shape arises from the assumption that timing and dynamics are associated, specially concerning certain interpretative styles of classical and romantic repertoire.

Gabrielsson (1987) found that the global dynamics of five expert performances of the theme of Mozart Piano Sonata K331 interacts with timing in order to determine some phrasing aspects. In an comprehensive study, Repp (1998; 1999) examined dynamic and temporal features of 117 expert performances of a excerpt by Chopin. Contrarily to Todd, he found that no temporal strategy showed a significant relation with the used dynamics. In this way, these two microstructural dimensions (timing and dynamics) seem to be independently controlled at a local level. This independence affords the artist a high level of freedom in order to shape his expression.

In a study about the hierarchical representations of musical structural while performing, SHIFRES Y MARTÍNEZ (2000) reported a detailed quantitative analysis of the expressive timing of six expert performances of a excerpt by J. S. BACH – Bourré I from the Cello Suite No. 3 in C major, measures 1-4. Data showed at least two independent timing strategies. Each individual performance could in a certain extent be associated to one of these such strategies. However, it was impossible to find two identical individual performances. It could not even be found two similar timing patterns for the two rythmically equivalent phrases of the fragment for any personal performance (figure 1). The examined timing variations were identified with the voice leading analysis from the H. SCHENKER's theory ([1979]-1935), noticing that the different strategies corresponded to different ways to give a hierarchical emphasis to such a voice leading.

In a further study, SHIFRES (2000a) referred to the use of dynamics in the same performances. Data obtained through the analysis of the dynamic envelope were showed as *Dynamic Profiles*, which were examined according to: 1) central tendencies of the use of the dynamics, using the arithmetic mean of all of the individual dynamic profiles; and 2) different dynamic strategies represented by the *Main Components* come from the factor analysis the six performances as a whole. His findings indicated that it is possible to model the use of dynamics according to its relation with timing at a global level. However, at a more local level each dynamic nuance is independently implemented both from the timing and the tonal attributes of the piece of music. Therefore, the artists emphasized both notes belonging to and notes outside from each local harmonic context, in a apparently non systematic way. These findings are contrary to certain models of implementation of dynamics in the expressive performance. (SUNDBERG, FRYDEN & ASKENFELT 1983).

Thus, temporal and dynamic strategies used by different performers display a high level of individuality. In order to go more deeply into such an individuality, a detailed analysis of three of them was previously presented (SHIFRES 2000b). In that opportunity the analyses were displayed using graphics of the time and dynamic variations. Analogously, the present paper reports the analysis of the others three individual cases of that qualified sample. In this occasion relationships between both micro structural components and their possible linking with structural attributes of the piece are emphasized.

Method

The Performances

Three expert performances of the Burré from Bach suite No. 3 for Solo Cello were used. They took part of the study reported in SHIFRES AND MARTÍNEZ (2000) but they were not individually described by SHIFRES (2000b). These versions were performed by MAURICE GENDROM, MITSLAV ROSTROPOVICH and PAUL TORTELIER. These versions were associated to different timing and dynamic factors in the study of the *Main Component* aforementioned works (SHIFRES & MARTÍNEZ, 2000; SHIFRES 2000a)

Procedure of Measurement

A standard software of sound edition (Sound Forge 4.5) was used for the analysis. It displays wave forms (amplitude envelops). Location of each onset was determined. The onsets 2-1 (measure 2 first beat) and 4-1 correspond to a chord – which, according to the possibilities of the cello is performed as arpeggio-. In such cases the highest onset pitch was considered, since this is the one represented in the reductions and different strategies of performance of the arpeggio are possible. In that way, 22 inter-onset intervals (IOI) were determined. From these IOI *Timing and Dynamic Profiles* were graphically represented.

Timing Profiles. Each IOI –measured in milliseconds- was divided by the nominal value of the note according to the tempo of the performance. The later is obtained dividing 15.000 (the number of milliseconds of a minute, divided by 4 –the number of quavers which are contained in a single temporal unit, the half-note) by the actual average duration of the minimal unit. A proportion of deviation of the actual performance from the nominal value was obtained. These values were graphically represented as *profiles of expressive timing*, in which the horizontal axis represents time and the vertical one represents the expressive deviation of each note. The value 0 represents the nominal timing.

Dynamic Profiles: The Root Mean Square (RMS) of the sample values in each IOI was obtained. Concerning short time intervals – like the ones analysed here -, this measurement is related to the level of sonority of the sound file. Therefore, it could be considered as equivalent to the perceived sonority of each tone. The obtained values were normalized and graphically displayed as a function of the deviation from the mean of sonority of the fragment as a whole. These graphics are the *expressive dynamic* profiles, in which the horizontal axe represents time and the vertical one displays the amount of expressive deviation from that mean of sonority of each tone.
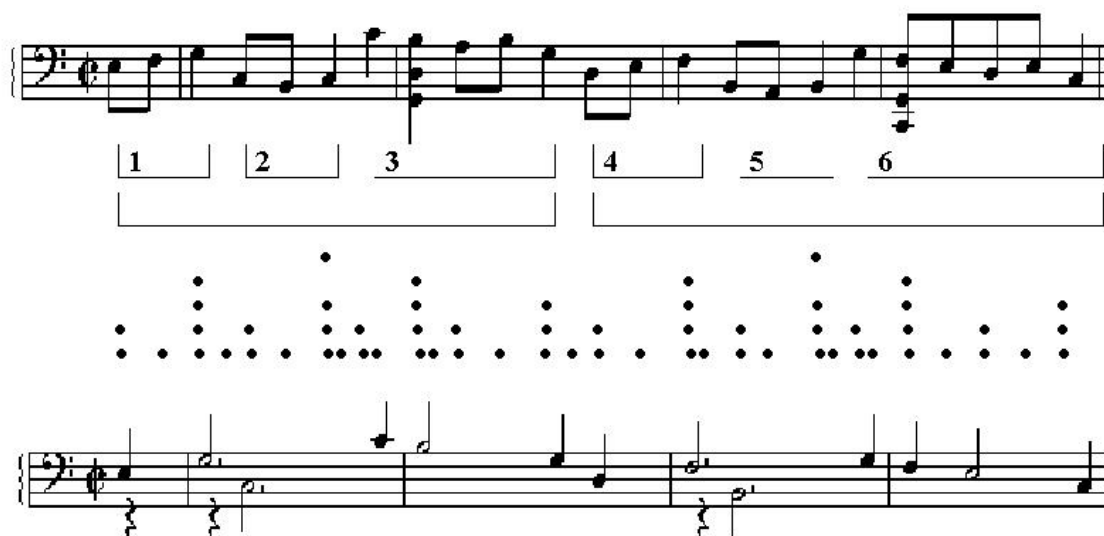
Figure 1. *Burré 1 from Suite No. 3 in C Major by J. S. BACH (measures 1-4). The brackets indicate grouping structure (LERDAHL & JACKENDOFF 1983) and the points metrical structure – in order to fit the score the points are not represented in an equidistant way-. The upper line of points indicates the hipermeter level (COOPER & MEYER 1960). At the bottom, the foreground reduction presented by SERAFINE, GLASMANN & OVERBEEKE (1989)according to the principles of the Schenkerian Theory (SCHENKER [1935] - 1979).*

Results

A description of each of the selected performances is presented according to the following categories: relationship dynamic profile / timing profile; 2) Relation between both profiles and grouping structure (LERDAHL & JACKENDOFF, 1983); 3) Relation between both profiles and metrical structure; 4) Relation between both profiles and tonal structure (Prolongational Reduction, according to the voice leading principles (SCHENKER, [1935] – 1979).

Maurice Gendrom

A great independence between temporal and dynamic strategies can be observed at first glance. Both profiles displayed the lowest correlation of the completed sample (r. = -.01). The pattern of rubato

presents a zig–zag shape. Notice that the second half of the phrase reverses the pattern of the first one. In that way, the longest tones (nominally, quarter notes) are shortened at the first half of the phrase, while in the second half they are lengthened. Concerning dynamic strategy, it could be clearly observed the articulation of both phrases making use of the *crecendo/diminuendo* pattern, as predicted by the TODD's (1992). Time strategy do not seem to give account of metrical structure, since the cellist use one resource in one half of the phrase, and the opposite in the second one. However, the dynamic strategy indicates the hipermeter, because of the curve is intended for the second and the fourth bars. The timing profile is reinforcing the structural notes of the measures 2 and 4 (B – G and F – E respectively. See reduction). Therefore, dynamic strategy seems to emphasize the grouping and the metrical components of the musical structure, while the temporal strategy would be highlighting the voice leading component.
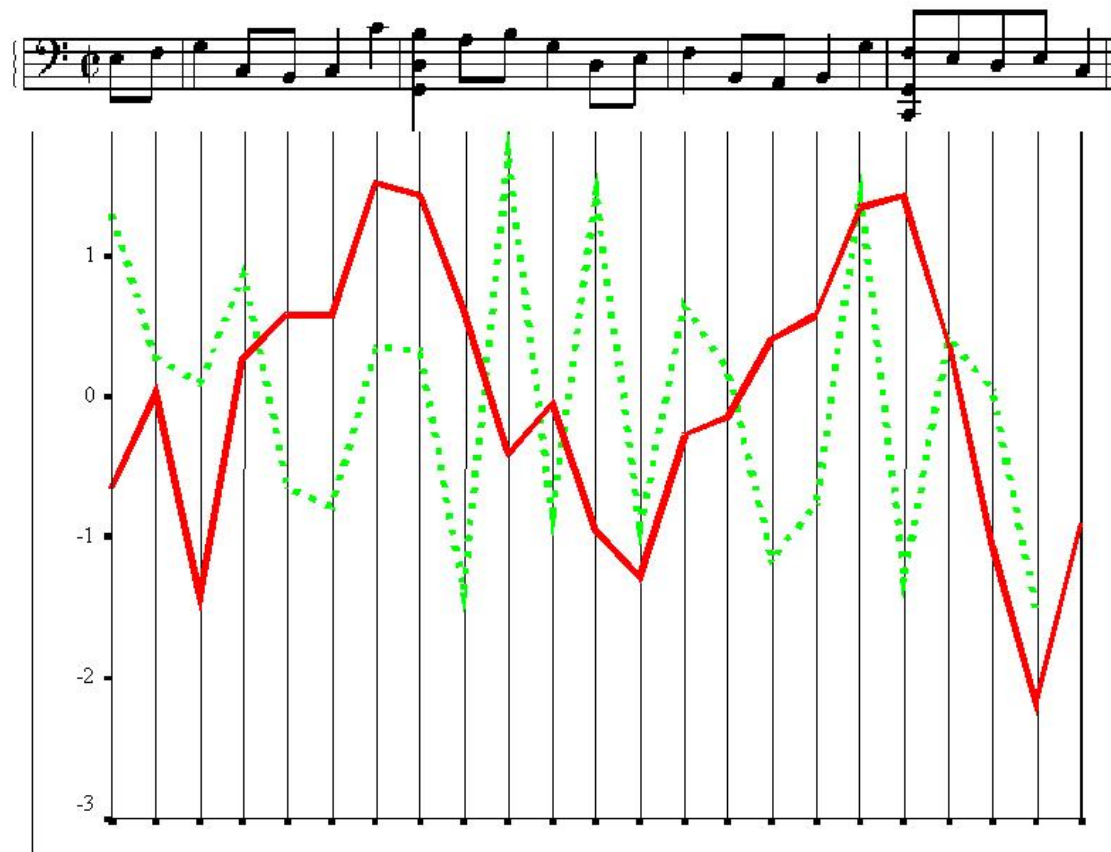
Figure 2. *Dynamic (red line) and timing (green line)profiles derived from the Maurice Gendrom's performance.*

Mitslav Rostropovich

The ROSTROPOVICH's version showed the highest negative correlation (although it was not significant) of the sample between time and dynamics. This is to say that he exhibits a tendency to compensate lengthening notes using softer touches and vice versa. It is possible to observe this fact at the beginning of each half of the phrase. Although the dynamic profile are globally marking both parts, at a more local level the treatment of both halves are completely and notably different (see, for example, the upbeat to both chords). In this way, it is difficult to find a relationship among the timing and the dynamics of the performance regarding to grouping and metrical structures beyond the global Cresc/Dimin. pattern of both halves (TODD, 1992). >From this perspective it is possible to assume that he has the intention of equalizing his touch by an independent and equilibrated use of both micro structural components. The pronounced *rit.* applied to the final E is deserving of attention. Notice that the ROSTROPOVICH'S version is the slowest performance of the entire sample (MM half note = 59). Therefore, it is possible to assume that this chosen basic tempo allows to make use of certain expressive resources (like this *rit.*) that could sound unnatural on other tempi. Clearly, this lengthening is in turn reinforcing the voice leading E – C at the end, which is compensated by the dynamics. The use of lengthen notes manifests the hierarchy of another notes (such as A and E at measure 2), which are not considered by the voice leading reduction. In this way, ROSTROPOVICH seems to look for a stronger sound homogeneity equalizing those notes that would be tonally less important.
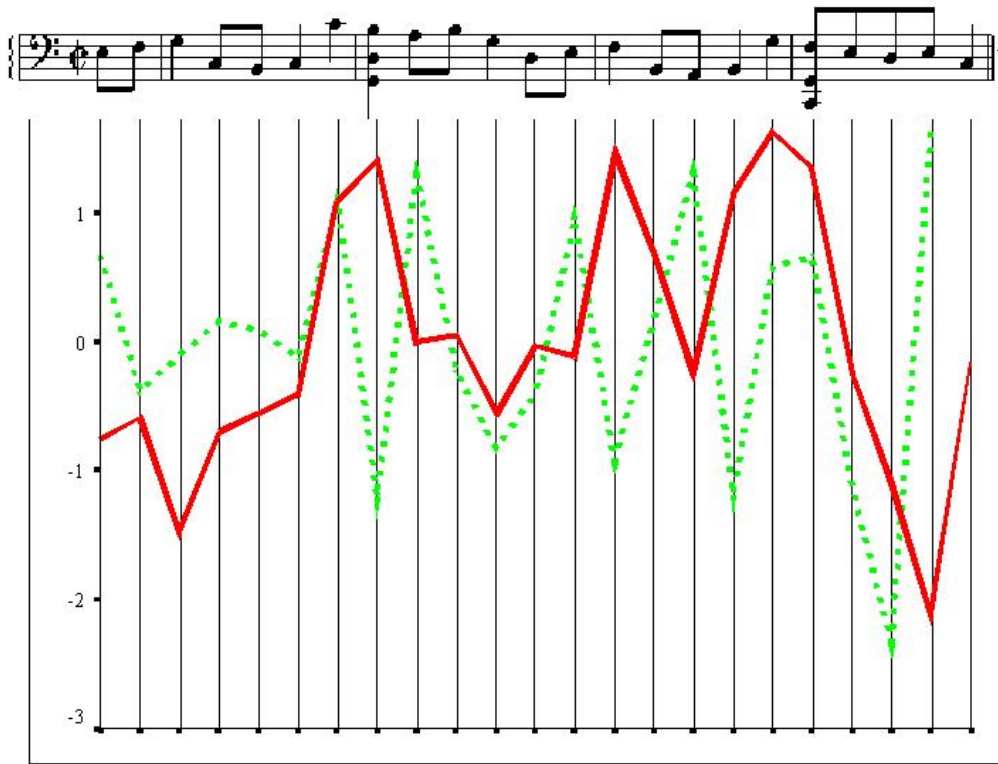
Figure 3. *Dynamic (red line) and timing (green line)profiles derived from the MitslavRostropovich's performance.*

Paul Tortelier

The TORTELIER'S version exhibits no clear relationship between the dynamic strategy and the temporal one – it had one of the lowest correlations of the entire sample -. This fact is noticeable in the light of the metrical structure. The dynamic profile clearly accounts the hierarchical levels of metrical structure (notice that i) the dynamic peaks correspond to the hipermeter level; ii) the subsequent salient points match with the meter level; and iii) the subsequent peaks match with the half notes level). However, concerning the timing profile, the hipermeter level is considerably shortened, while the firsts beats of measures 1 and 3 are relatively lengthened. The grouping structure is indicated only by a subtle lengthening of the two last notes –in both halves of the phrase -. Nevertheless, since the chosen tempo by the performer (MM half note = 74) and the existence in both halves of another extreme lengthenings either at the same or at higher levels, the reinforcing of the grouping articulation would uncertain. However, at a local level, these final *rit.* would be marking the voice leading B – G, at measure 2 and E – C at measure 4. Contrarily, between measures 2 and 3, the voice leading E – F would be highlighted (Note that the Theory indicates a voice leading D-F – see reduction).
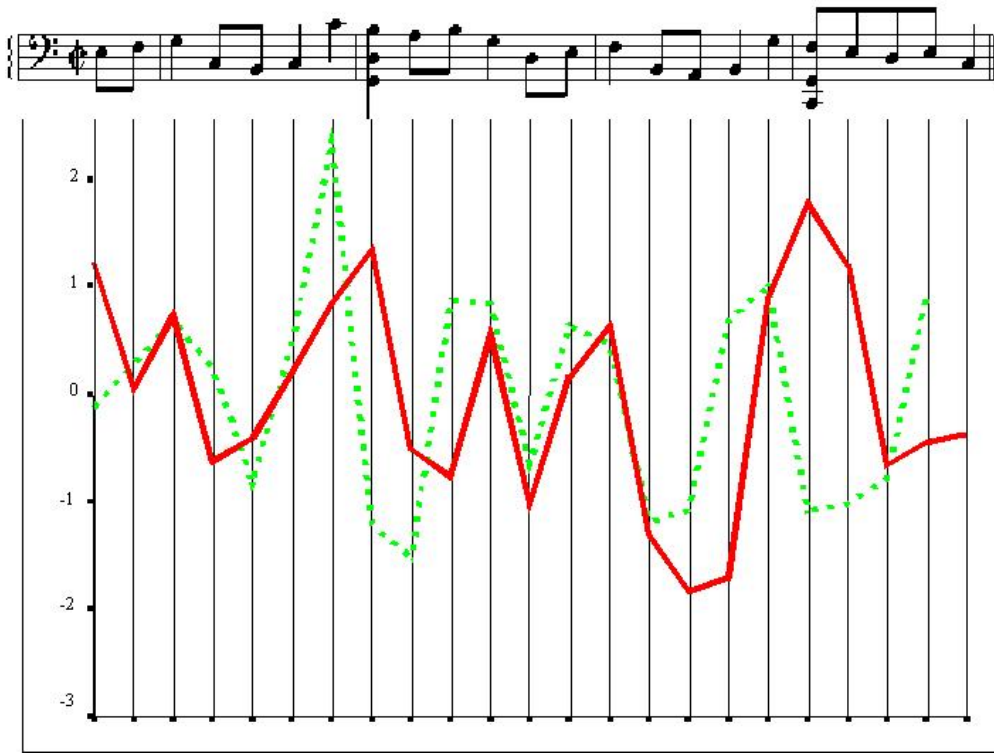
Figure 4. *Dynamic (red line) and timing (green line)profiles derived from the Paul Tortelier's performance.*

Conclusions

The aim of this paper was to describe the use of dynamics and rubato in three expert performances of the Bourré from the Suite No. 3 for Solo Cello by J. S. BACH (measures 1-4), focusing on the relations among micro structural components and their connections with musical attributes such as Grouping and Metrical Structures (LERDAHL & JACKENDOFF, 1983) and the underlying voice leading (SCHENKER, [1935] - 1979).

In general terms, we can say that the performers have a high level of independence concerning the use of dynamics and timing, and they use this independence in order to homogenize their touches. In some cases, this homogenisation is achieved by compensating the self emphasis that certain notes receive because of their structural status.

Apparently, rubato patterns are more *self compensated,* that is to say, they do not describe important and global arches but mark differences at a more local level. Many of these differences are related to the *short/long* rhythmic relation. Thus, the tendency is to shorten the relatively longer values (quarter notes, in this case), with regard to their nominal values (PENEL & DRAKE 1998). In other cases, however, long values are lengthened. Since in this Bach's except longer notes are located on with metrically important places, it is possible to assume that these lengthenings are referred to metrical structure.

As regards grouping structure, dynamic strategy appears to be the most used at more global levels (ROSTROPOVICH). However, concerning groupings at lower levels, it is not possible to delineate general behaviours. In general terms, a tendency to use the dynamic strategy in order to project firstly metrical structure, and secondly, grouping structure can be appreciated.

Concerning underlying voice leading, the timing profiles seem to contribute to their configuration. As early as in a previous study SHIFRES & MARTÍNEZ (2000) have indicated that the inner voice is performed slightly faster. Furthermore, timing profiles show more activity in the end of the unities (coinciding with places of great ambiguity generated by rivalry between metrical structure and voice leading structure.)

Patterns of dynamics and rubato are applied by experts in order to provide unity, sense of direction, and discursive coherence to their performances, according to structural features of the piece of music. The non systematic use of both attributes by a same performer, allows us to think about an unconscious nature of such an use. Probably, an artists is thinking in his goal – to communicate structural features, to homogenize his touch, etc. -, and uses different strategies which are implicit in his *particular touch*, which was acquired, modelled, developed, and probed throughout his musical life.

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Bourré I from Suite No. 3 in C Major for Solo Cello

(Artists. Company. Number)

GENDRON, MAURICE. Phillips. 442 239-2

ROSTROPOVICH, MSTISLAV. EMI. 7243 5 55365 2 5

TORTELIER, PAUL. EMI. 7243 5 73526 2 8

Biography

A pianist and conductor, **Favio Shifres** teaches at Universidad Nacional de La Plata. His research interests lie in the field of the cognitive sciences of music, with particular reference to the psychologic processes involved in the performance of music.