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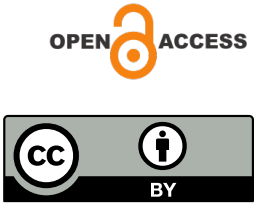

Thinking through the Body

Music Theory for the Performer *

George Papageorgiou

There is significant controversy between music theorists and performers about the value and relevance of the study of music theory for performers. As I argue in this paper, the dissatisfaction on the part of performers about the value of existing analytical methods stems from the fact that the majority of these methods do not address the particular needs of performers, who, unlike theorists, engage with music in a more bodily than intellectual way. The goal of this article is to propose new methods of analysis that promise to engage performer-students equally with the mind and the body.
The methods proposed here share with Dalcroze Eurhythmics the belief that by experiencing music through the whole body, students develop important kinaesthetic skills necessary to understanding music more deeply and expressing themselves more musically. By revealing the connection between musical and physical movement, the two analytical representations proposed – the *bouncing ball* and *gestural arrow* – allow analysts to capture expressive movement while encouraging more bodily involvement in the analytical process. Structural analysis involves the exploration of both the *expressive potential* inherent in the notes of the musical score and the precise expressive effect of the way these notes are performed. The emphasis on rhythmic process and expressive nuance allows performer-analysts to engage with and become sensitized to qualities of music directly related to the act of performance.

The teaching of music theory to students of all stages has always been considered important in developing well-rounded musicians. Exactly how much theory and which specific theories and analytical methods are most beneficial is a matter of significant controversy. Such controversy, not only among music theorists but also, and especially, between theorists and performers, has resulted, as Tim Howell pointed out, in an uneasy and at times polemical discourse.[1] Attempts to address the needs of performers by focusing on the analysis of performance have not always been received very favourably. The approaches of theorists such as Heinrich Schenker, Wallace Berry and Eugene Narmour[2] have been particularly alienating to performers, who have a sense that these theorists' analyses, to put it in Howell's words, »are not there to ›direct‹ the performer, but to dictate to him«.[3] Authoritarianism is not, however, the only cause of this dissatisfaction. As I will argue in this paper, the

* I am indebted to Nicholas Cook for reading a draft of this paper and providing endless suggestions for improvement.

1 Howell, *Analysis and Performance*, p. 693.

2 Berry, *Musical Structure*; Schenker, *Free Composition*; Narmour, *On the Relationship of Analytical Theory to Performance and Interpretation*.

3 Howell, *Analysis and Performance*, p. 697.

main problem lies in the different ways theorists and performers engage with music and in the fact that music theory emphasizes abstract, conceptual approaches rather than bodily thinking, which is central to the way performers engage with and understand music. As a solution, I will propose various related analytical methods which promise to engage performers both bodily and intellectually.

A video (see video example 1) with a few excerpts from a piano master class given by Maria João Pires provides a better idea of the processes involved in the art of performance and the way these are understood by performers. A dialogue between Pires and a student documented on this video is transcribed below[4]:

S: [Plays Variation 1 of Ludwig van Beethoven's 32 Variations for piano in C Minor]
P: Now, what is the meaning of this? What means this?! What do you feel?!
S: I feel like it's not a clear image, like a ghost or something, it's passing by but you can never really see what it really is.
P: But after you have felt this, you know, »hhhh«, then you cannot »pa-pa-pa« because it doesn't fit. Feel with your body. Don't feel it here [points at her head]. Don't hear what I am saying, I am not talking to you. I don't exist. You are feeling now something. I am just helping you to feel something. Feel it with all your being.
[....]
S: [Plays]
P: Why is it staccato? Who says? You? Your feeling says that it's staccato?
S: Yes.
P: Really? Promise me?
S: My feeling of... no... ok, my brain says me, yeah. My sense of style says me I have to play everything staccato.
P: What is style?
[...]
S: [Plays Variation 5]
P: No, don't be, no,... never be, never make rubato, just get nervous, try to get nervous yourself, feel it, your heart beating has to go up, up, up, don't let your brain work.
[...]
S: [Plays Variation 28]
P: Move... [moving her hands]... imagine a bird that is flying, like this you know, just flying without really flying, just going with the wind, ok?
S: [Plays].

What's immediately striking from this dialogue is the complete mistrust of rational thinking in shaping musical expression. Performers know that in order to give life to the notes they play, they have to rely predominantly on their body's intuitive response to the notes played, on their innermost feelings and their sense of bodily or imagined movement. Even though they do take time to study the score and make conscious performance decisions, the most crucial work takes place in real-time while performing. This is a very different kind of activity from what music theorists typically do. Music theorists are used to getting to know music mostly through abstract structural representations that they rationalize generally *out of* real-time. The diametrical opposition in the way performers and theorists engage with music is

4 This video, along with the ones that will be cited below, can be downloaded from ›http://www.youtube.com/watch?v=w8h9NXo9LUE‹ (last access: 4 June 2010). These excerpts are part of a video clip available at ›http://www.youtube.com/watch?v=Wt44q73SGs‹ (last access: 11 May 2010).

illustrated in Figure 1. Musical experience is represented here on a two-dimensional space, where the x-axis involves the body/mind dichotomy and the y-axis the in-real-time/out-of-real-time dichotomy. Attempts at convergence between these positions have resulted mainly in exchanging roles momentarily – such as when theorists seek analytical insights by performing or listening to the music analyzed, or when performers become theorists for a moment by trying to use score analysis to make conscious performance decisions.

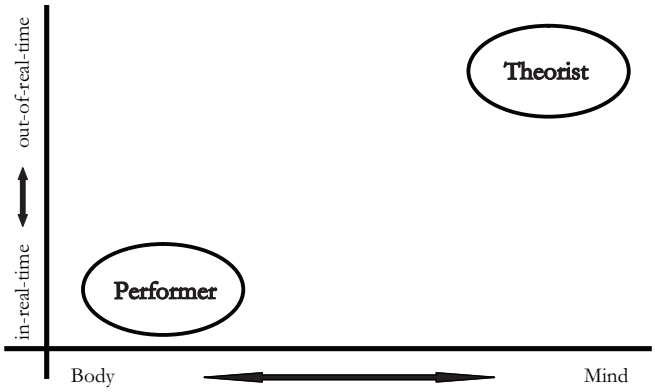

Figure 1: Performer vs. theorist dichotomy of engaging with music.

The fact that theorists and performers use different languages to understand or create music becomes a barrier to bridging the gap between theory and practice. Conscious attempts by theorists at providing translations from one to the other have not generally been very successful. I have in mind here approaches which are basically one-to-one mappings of analysis to performance[5], where a finished analysis is supposed to guide decisions about how the music should be played. Such approaches, as Nicholas Cook pointed out, give ultimate authority to the analyst while taking away the creative freedom of the performers.[6] While such one-way approaches are obviously problematic, the main problem is that they do not allow for the body, in addition to the mind, to engage actively in making analytical decisions.

Empirical evidence has shown the importance of the body in both »the formation of musical knowledge and the expression of it«[7] – the inseparability, in other words, of intellectual and bodily knowledge.[8] Jane Davidson and Salgado Correia, for example, have argued that »the body is not only essential to the physical manipulation of the instrument for the accurate execution of music, but it is also vital in the generation of expressive ideas about the music.«[9] A number of other, more specific studies have shown that there is close correspondence between expressive musical gestures (as manifested in the performer's microvariations in timing and dynamic

5 See footnote 2 for a few examples of such approaches.
6 Cook, *Analysing Performance*, p. 246.
7 Davidson/Correia, *Meaningful Musical Performance*, pp. 70–83.
8 Johnson, *The Body in the Mind*; Lakoff/Johnson, *Metaphors we Live by* and *Philosophy in the Flesh*; Cox, *The Metaphorical Logic of Musical Motion and Space*; Johnson/Larson, *»Something in the Way She Moves«*.
9 Davidson/Correia, *Body Movement*, p. 237

patterns) and bodily gestures, pointing to the crucial role of bodily sensation in the way performers express themselves during performance.[10]

Perhaps more than any other, the Dalcroze method, also known as Eurhythmics, has given the body a central role in the learning process. Émile Jaques-Dalcroze believed that experiencing music through the whole body leads to a deeper understanding of its meaning and that by developing mental and kinaesthetic awareness (that is, muscular rhythms and nervous sensibility) students would come to express themselves more musically.[11] This method, thus, gives particular emphasis to a type of musical understanding which relies on intuitive movement to develop important psychosomatic skills. This is quite different from most traditional music theory and analysis, which, through rational thinking, seems to emphasize the analytical product.[12] While a number of theorists such as Nicholas Cook and Tim Howell have argued that the value of analysis lies in its process and not its product[13], no analytical process is equally valuable to performers. For performers, I argue, an analytical process is needed that, like Eurhythmics, gives emphasis to the development of those skills that will help them think from inside out using the whole body. The analytical methods that I will propose below aim to achieve these objectives while staying as close as possible to traditional music theory and analysis. My aim, in other words, is to »eurhythmicize« traditional music theory and analysis, or to provide a link between musical structure and embodied experience – a link that achieves close integration between the ways that theorists and performers engage with music. In short, my aim is to propose methods that will encourage thinking through the body and embodying through the mind.

The specific analytical language one uses is very crucial in the kind of analytical process involved. For instance, if you undertake a Roman-numeral analysis, you will think about and experience the music being analysed in a very different way than if you had tried to describe it in terms of, say, a series of emotional states. In the first case you need to decide how abstract musical objects such as keys, chords, scales and intervals relate to each other and thus you experience the music more intellectually; in the second case, in order to determine whether the music induces emotions of sadness, happiness, fear etc., you will need to encourage your body to actually experience such emotional states. The use of specific analytical concepts, thus makes it possible to control the way one engages with music during the analytical process. This observation is the reverse of what George Lakoff and Mark Johnson describe in their theory of conceptual structure, according to which bodily processes influence and constrain cognitive information processing so that the resulting knowledge is structured in a largely metaphorical way.[14] In the analytical methods that I will propose below, I use specific embodied metaphors as analytical concepts so that

10 Todd, *A Model of Expressive Timing* and *The Dynamics of Dynamics*; Kronman/Sundberg, *Is the Musical Ritard an Allusion to Physical Motion?*; Friberg/Sundberg, *Does Music Performance Allude to Locomotion?*; Repp, *A Constraint on the Expressive Timing of a Melodic Gesture* and *Diversity and Commonality in Music Performance.*

11 Jaques-Dalcroze, *Rhythm* and *Eurhythmics.*

12 In Schenkerian analysis, for example, you first come up with your graph, the product, and then you use this graph to see how it might inform your performance of the piece, if that is the ultimate goal.

13 Cook, *Analysing Performance*; Howell, *Analysis and Performance.*

14 Lakoff/Johnson, *Metaphors we Live by*; Johnson, *The Body in the Mind.*

corresponding bodily processes are triggered during the analytical process. The interdependence of bodily and cognitive processes with embodied metaphors is schematically represented in Figure 2.

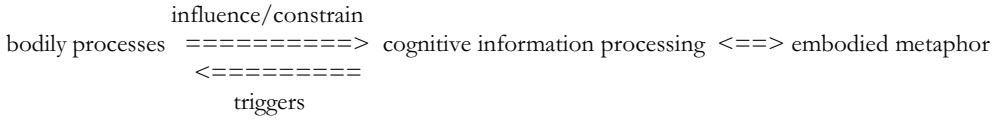

Figure 2: Interdependence of bodily and cognitive processes with embodied metaphors.

The proposed methods will make use of two analytical representations: the bouncing ball and the gestural arrow. The aim of both is to capture the expressive movement of music. They will be used in two different ways: as tools for the analysis of performance interpretation from commercial recordings, or as guidelines for the creation of new interpretations.

I begin by proposing an analytical language, which, like Eurhythmics, involves describing the musical flow in terms of physical movement, in this case virtual or imagined movement. Imagine a computer program, which allows you to very easily create an animation of a bouncing ball moving expressively to the music (video example 2).[15] The programming language consists of a series of movement patterns that can be joined together to describe the dynamic, motional character of music, always as perceived by the user. The connection of this method with Eurhythmics should be obvious. What might be less obvious is how exactly these particular virtual movements relate to our ordinary musical experience, how the specific analytical process relates to music theory and in what ways it might be beneficial to performers.

We all experience music physically in some way or another, even though we are not always aware of it. The most basic physical reaction is the synchronisation of our bodies to the beat of the music – a process referred to as entrainment – , which can happen most commonly through foot or hand tapping, head nodding or body swaying. Other, more subtle movements can take the form of covert muscle tension and relaxation or even psychological, imagined movement. What's important in such movements are not details of muscle type, location and direction in real space-time, but rather their overall dynamic or expressive character. These bouncing ball movements can best be understood as analytical reductions of our bodily and psychological experience of musical movement. Physical reaction, in other words, becomes musically meaningful once it is understood in relation to the music as a series of continuously flowing rhythmic gestures organised hierarchically around goal moments – the ball impacts or musical/metrical accents.

The goal of the method is not only to encourage understanding of expressive movement in terms of physical movement and sensation, but also to relate this experience to the structure of the music. This kind of analysis is less improvisatory than Eurhythmics, necessitating more conscious reflection on the analyst's part

15 The music modelled by the bouncing ball animation here is Frédéric Chopin's Prélude op. 28,17 as performed by Cyprien Katsaris (see Discography).

about the structure of the music heard. Section by section, a fitting animated movement has to be determined, something that involves not only rational but also, and especially, bodily thinking. Part of the process involves segmentation of the music into meaningful gestural groups; these can be formal or phrase groups, rhythmic or melodic/motivic ideas, contrapuntal lines, metrical cycles etc. Interestingly, segmentation can be made without having to employ any traditional analytical concepts and methods, or even without the use of a score, since it takes place on an instinctive, intuitive level when one focusses on the dynamic character of these groups or patterns. This makes analysis less intimidating to students and, at the same time, more fun and relevant to the bodily aspect of their experience of the music. The method is particularly engaging due to the fact that in order to determine the precise expressive meaning of these movement gestures (that is, their exact shape, height and speed patterns) it is necessary to rely on and observe closely one's own bodily reactions as one moves (physically or in one's imagination) to the music.

Thus, by encouraging more bodily involvement, performer-analysts become more sensitive to the subtleties of motion and expression in music. In addition, as they become more consciously aware of the bodily reactions that correspond to the dynamic qualities of a musical work, they are better able to control such processes during performance. Exaggerated physical movements (such as those of dancers or some conductors) are not what's most relevant here. What is needed is the ability to control and externalize fine internal motional energies that originate in the mind, pass through the body and become sound during performance.

The method I have just described emphasizes the more intuitive and instinctive aspects of analysis: listening and bodily sensation were used to determine the expressive content of the music, making a systematic study of musical structure (either the score or the recorded sound) unnecessary. However, musical structure plays a more central role in another analytical language that I am going to introduce now. The more static nature of the graphic representation of this language will help to create a link between structure and bodily experience. In addition, its strongly suggestive visual aspect will help to concretise the otherwise very fleeting and ineffable nature of musical expression and allow for a more systematic study and evaluation.

Figure 3a shows a series of four successive notes of equal length in the form of notated music. When realized as sound, these notes also involve dynamic qualities as experienced by performer or listener. These dynamic qualities are represented by the curved arrows in Figure 3b. Given their simple and naturally flowing nature, these gestures will be considered as constituting a prototypical motion cycle. One such cycle consists of two symmetrically-ordered gestures that move away from and towards beginning motion cycle articulations or accents: these are described respectively as an anacrusis (AN), a goal-directed process experienced as an increase of musical momentum, and a metacrusis (ME), a goal-dissipating process experienced as a decrease of musical momentum. The dynamic character of these two gestures can be better understood in terms of the motion of a ball accelerating towards the ground and bouncing back in decelerating motion (video example 3). The same gestures can also be understood in a similar way in terms of the movement of a pendulum (video example 4).

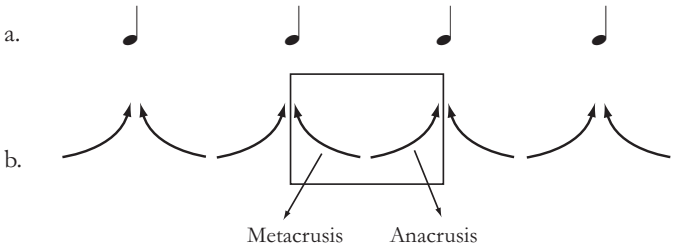

Figure 3: Regular series of prototypical motion cycles.

At this point an important distinction must be drawn. There is significant difference between the movement implied by the compositional structure of the music (that is, the notes in the score to be played), and the movement realized in sound by the performer and experienced by the listener. The first, which I shall refer to as the *expressive potential* of the score, will be determined by a close analysis of the compositional structure, the second by a close analysis of the performance, informed by the results of the first analysis.[16] I shall consider each of these in turn.

Unlike most traditional music analysis, the focus of my analysis of expressive potential will be on how various structural patterns influence the act of performance and how they contribute to the expressive character of the resulting sound. In order for performers to have total control of the way they play the notes and shape expression during performance, it is vital that they have a good sense of how these notes influence and constrain their movements so that they become more sensitive and freely responsive to the expressive power of the structure of music.

Musical (and physical) movement is of a very flexible nature and almost never appears in the very regular manner shown in Figure 3. The complexity of musical structure encourages movements that deviate from the prototypical motion cycle in ways suggested by Figure 4. Here I show how the overall strength of expressive gestures can vary, graphically captured by the angle and curve of the gestural arrow: strong anacruses and metacruses are shown with upward-pointing arrows and weak ones with downward-pointing arrows. Moreover, the figure introduces two more types of gestures that can appear in the inner part of a motion cycle of a relatively long duration. The increase of musical momentum (IN) is experienced as an increase of musical momentum, like an anacrusis, except that it has no goal-directed character and does not lead into a goal accent (that is why there is no arrow head). The decrease of musical momentum (DE) gesture has the same relationship to the metacrusis.

How the structure contributes to musical movement is not a given to performer-analysts but the outcome of a process of discovery and self-exploration. Figure 5 shows the steps that one might follow in determining the expressive potential in the beginning of the first movement's theme from Wolfgang Amadeus Mozart's Piano Sonata in A Major K. 331. Starting from the most basic structural articulations, the

16 For an approach to musical expression along the same lines see Parncutt, *Accents and Expression in Piano Performance*, where his distinction between »immanent accents« and »performed accents« implies the distinction drawn here.

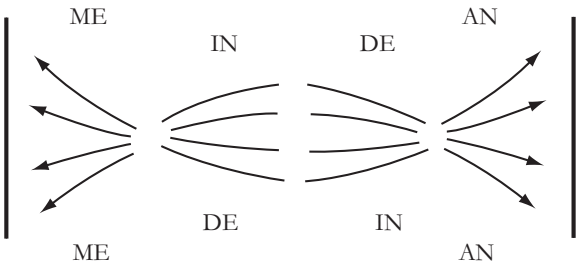

Figure 4: Four motion-cycle phases or gestures and their basic reshapings and arrangements within a motion cycle.

first level (Fig. 5a) shows how changes of harmony or chordal inversions and melodic leaps, both in the bass and the soprano line, shape motion cycles every half bar (with an exception in the fourth bar). At Figure 5b these motion cycles group into bar-length cycles. Figure 5c combines the two previous levels of structure into one graph. So far, this roughly corresponds to our traditional notion of metrical structure, which understands the experience of metre as an idealized, regular succession of cycles. If, however, one continues to look more deeply into the structure of the piece, one will soon realise that metrical processes are interrelated with and indistinguishable from subtle rhythmic processes.[17] This is especially crucial for performers who, in order to shape rhythmically flexible and musical phrases, must resist any simplistic understanding of metrical structure which could result in a rather mechanical playing.

Figure 5d continues to convey regular metrical cycles while taking into account the power of the melodic and chordal structures of the theme to reshape these prototypical gestural patterns. The ascending melodic direction of both the soprano and bass line from the first to the second beat in each of the first two bars changes the dynamic by weakening the beginning metacruses as shown in the graph. (See especially the dashed-line bar-level graph at the beginning.) The reverse process takes place during the second half of each of these bars. These patterns are further strengthened by the inherent sensory/acoustic tension of the successive chords as determined by their inversion, the presence of 7ths or other dissonant pitches and the choice of soprano notes: the motion in the first half of the first bar from a root position triad, with the third in the soprano, to a more unstable first inversion, with the fifth in the soprano, increases musical tension. The same occurs in the first half of the second bar, where a first inversion triad, with the fifth in the soprano, gives way to a more unstable third inversion seventh chord, with the seventh in the soprano. Applying the same principles of structural contribution to the final two bars yields the results shown in Figure 5d. Note here how while in a prototypical motion cycle a metacrusis involves decrease and an anacrusis increase of musical tension, the structural patterns of Mozart's phrase encourage the reverse.

17 Christopher Hasty's *Meter as Rhythm* is perhaps the most representative study arguing for the inseparability of metre and rhythm.

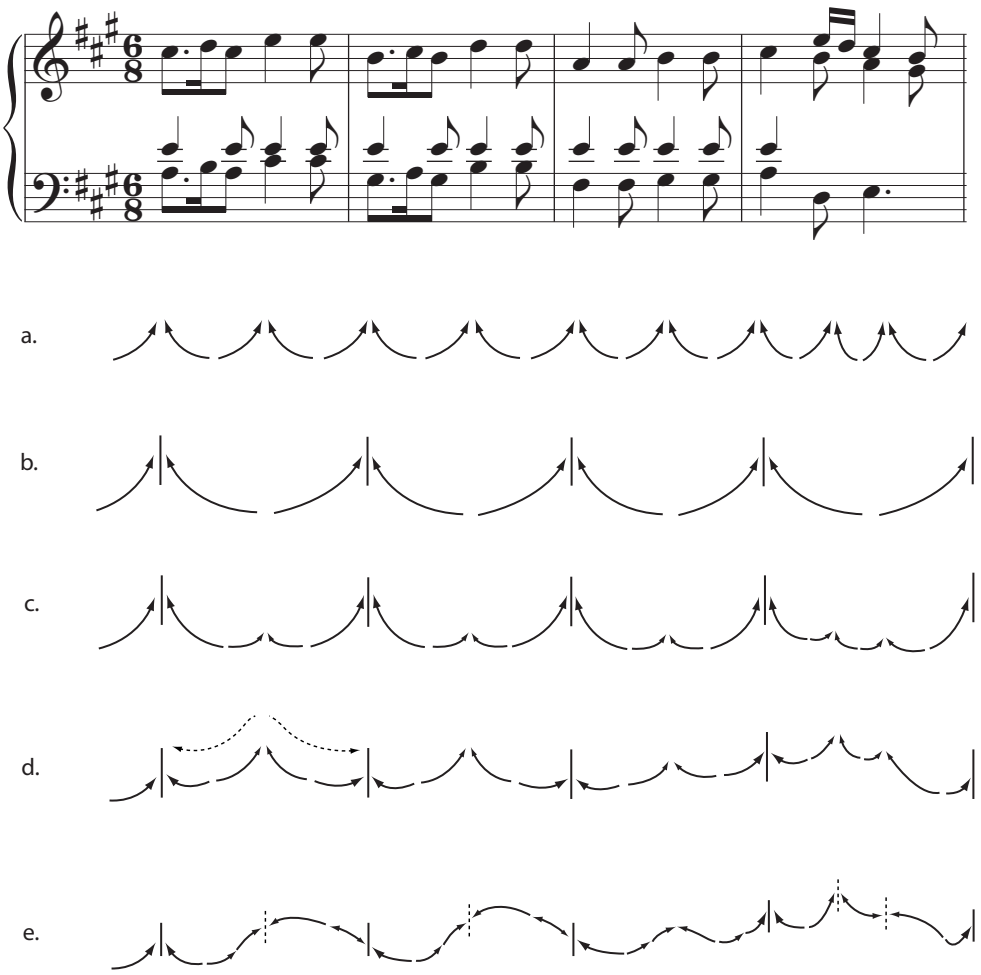

Figure 5: Analytical stages in exploring the expressive potential in Mozart's Piano Sonata A Major K. 331, first movement, b. 1–4.

The analytical process just outlined involves the observation of the various structural patterns which, both in isolation and in combination, influence the shaping of musical motion. When all structural factors have been considered, including those of rhythmic activity and harmonic function, the final analysis could look like Figure 5e. Figure 6 further clarifies the meaning of the first bar of the graph of Figure 5 by showing its implications for the performer. For clarity, in Figure 6b I separate out the different structural levels combined in a single graph in Figure 6a. The expressive potential of this first bar encourages the performer to emphasize the middle of the bar through an anacrustic motion leading up to that point (see the lower-level dashed barline in the graph of Figure 6a, illustrated on a separate structural level in the middle and lower graphs of Figure 6b). The dynamic of the inner part of the bar-level motion cycle is further modified by two more lower-level motion-cycle beginnings on the third and fifth sub-beat locations.

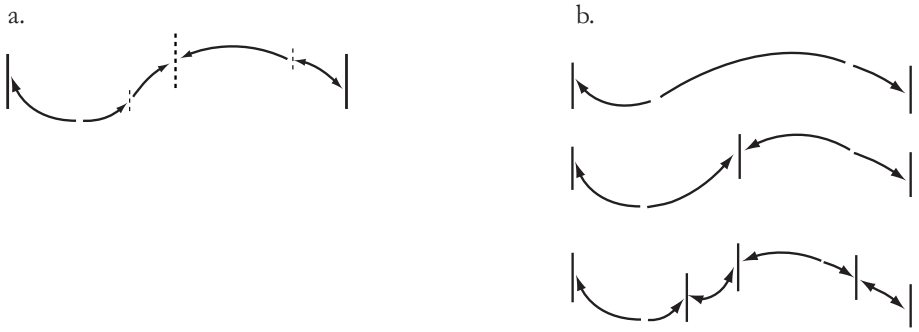

Figure 6: Expressive potential of the first bar of Mozart's Piano Sonata K. 331, shown as (a) a single motion graph and (b) multiple levels.

Having experienced the dynamic implications of structure both bodily and rationally, performers can explore ways in which they can go with or against the expressive potential to shape their own performance interpretations. Figure 7 shows four ways this expressive potential might be reshaped. Reacting positively to the mid-bar articulation, a performer, through appropriate tempo and dynamic shadings, can emphasise it even more, as shown in Figure 7a, creating a strongly competing metrical downbeat at that point (video example 5 demonstrates the motional character of this performance option through a bouncing ball animation). Alternatively, this mid-bar articulation can be neutralized (by going against the expressive potential), in order to shape more unambiguous and conflict-free bar-level motion cycles aligned with the notated metre (Fig. 7b). Note how the gestures that converge on the mid-bar articulation are weakened, minimising the perceived accentuation at that point (video example 6).

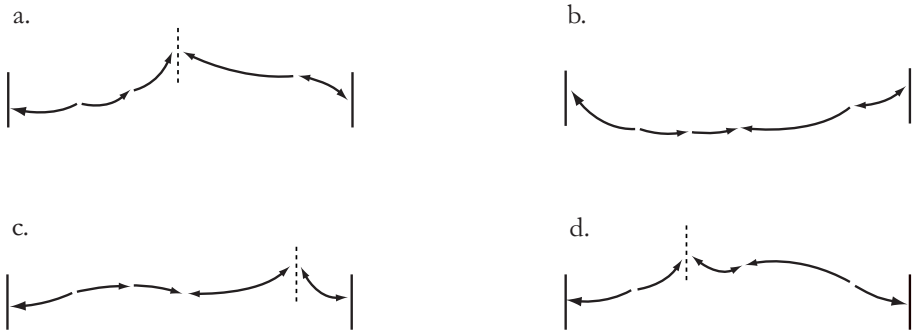

Figure 7: Reshapings of the expressive potential of the first bar of Mozart's Piano Sonata K. 331 during performance.

Two more interpretations are shown in Figures 7c and d, with the performers reacting to different structural factors. In 7c, the performer responds in agreement with the motion gesture implied by the melodic descent at the beginning of the second bar; in 7d, the performer responds to and emphasizes the short sixteenth-note

neighbouring tones in the melodic line that lead anacrustically into the longer eighth-notes. In both cases, a more asymmetrical motion-cycle formation takes place with momentum peaks either very early or very late in the bar-long cycle.

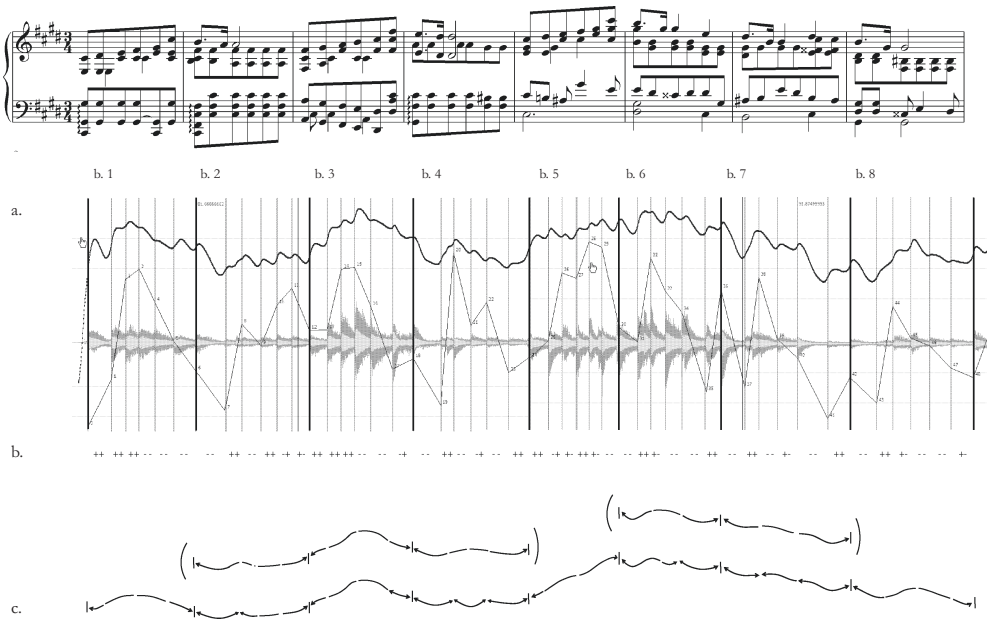

Figure 8: Scriabin: Etude in C sharp Minor op. 2,1. a) performance structure of Horowitz's interpretation; b) basic dynamic-tempo pattern analysis; c) gestural graph. In 7a the waveform and top graph represent the intensity of the musical flow; the lower graph represents tempo fluctuation, where going up means increase and going down decrease of tempo.

In the above examples, the focus was on compositional structure and the way its expressive potential can constrain and at the same time inspire various interpretations. Details of performance expression were negotiated on an intuitive level in real time. A more systematic study of those expressive details is the focus of the following analytical process, which takes the performance structure as the starting point. Figure 8a comprises tempo and dynamic graphs extracted from a recording of Vladimir Horowitz's performance of Alexander Scriabin's Etude in C sharp Minor op. 2,1.[18] The task is to come up with a graph of the expressive content of the music like the one shown in Figure 8c[19] (video example 7). The types and lengths of the motion gestures determined in the first analytical stage are now given precise shape by taking into account performance details. The tempo and dynamic fluctuation graphs form a good starting point. To make sense of the complexity of these patterns, I propose looking at patterns of increase (+) and decrease (-) for every sub-beat (represented by the vertical lines in Fig. 8a). If these patterns are considered as one

18 See Discography. The computer program *Sonic Visualiser* has been used for this purpose. More information about this program and its use for musicological purposes can be found at ›http://sonicvisualiser.org‹ and ›http://www.charm.rhul.ac.uk/analysing/p9_0_1.html‹ (last access: 11 May 2010).

19 The bracketed top graph shows more clearly the bar-level motion cycles.

unit – a dynamic-tempo (D-T)-pattern – we see that there are only four possible such pairs: »+ +«, »+ -«, »- +« and »- -« where the first sign always refers to dynamics and the second to tempo values. Figure 8b indicates the D-T-patterns for every quaver beat. It is the most basic analytical stage and does not take into account details such as the intensity of each parametric change.

If, in attempting to assign expressive meaning to gestural patterns, we consider each gesture to correspond to two different D-T-patterns, the possible pairs of such patterns multiply, as shown on the matrix of Figure 9. This matrix, which is intended only as a conceptual guide, provides a classification of the ways in which D-T-patterns encourage subtle expressive gestural nuances – here, all varieties of an anacrustic gesture. Each anacrustic gesture consists of two parts – the main part and its tip – which can be of different strength depending on the specific D-T-patterns involved. Gestural strength, which is represented by the direction and angle of the arrow line, is determined by the four basic D-T-patterns, ordered from the strongest to the weakest inducing musical momentum. Thus, as we move from left to right on the matrix, the strength of the main part of the gesture (the first D-T-pattern of each pair) decreases, while from top to bottom, the strength of the tip of the gesture (second D-T-pattern) decreases. The reverse applies to metacrusis, where the strongest gesture is the one shaped by a »- -« D-T-pattern. IN and DE gestures can be characterized by single D-T-patterns like the main part of anacruses and metacruses respectively.

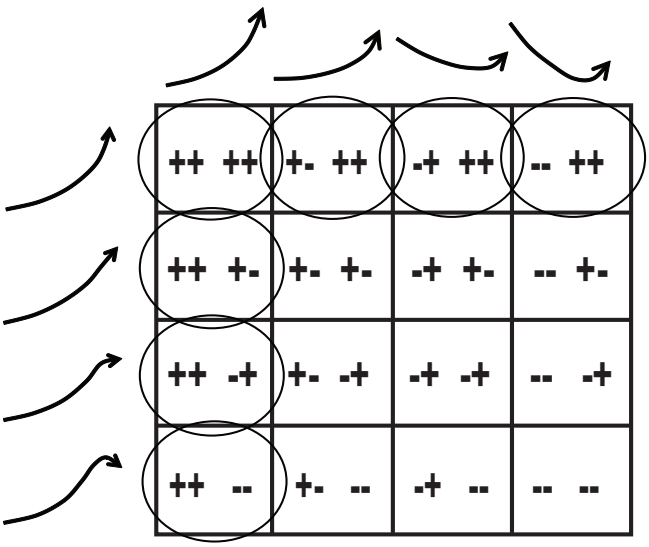

Figure 9: Matrix showing how D-T-patterns modify the expressive character of anacrustic gestures.

To complete such an analysis, it would be necessary to engage both the ear and kinaesthetic awareness. Other parameters to be considered might include the absolute value and degree of change of each pattern and their relationship to the compositional structure. Nor does the analysis end here: it is only the starting point for a more sophisticated study of specific performance interpretations. Once the basic

aspects of performance expression – which is otherwise hard to grasp and discuss due to its very fleeting nature – have been captured on paper, the analyst can now, among other things, more easily make comparisons between different interpretations, observe patterns of performance style, and trace large-scale processes of gestural transformation.

In Scriabin's Etude, for example, one of the most interesting things one can trace is the way in which the different repetitions of the main motivic idea presented in the first two bars are transformed throughout the piece. This idea is repeated sequentially three times, creating a 2+2+4 bar sentence structure. Horowitz's performance only gradually realizes the expressive potential of the main motivic phrase – that is, the tendency of the first bar of the phrase to move anacrustically into the second. In the first sequential pattern, an early IN phase, which creates an expectation for a strong anacrusis, is followed by a DE phase and a weak »-- --« AN. Here one can hardly hear the downbeat of bar 2 as the goal of the previous process. In the second repetition, a similar process takes place but with stronger IN and AN phases. But here, too, we do not hear a strong sense of arrival on the second half of the phrase. It is only in the final sequential pattern that the expressive potential of the motivic idea is fully realized, with a strong IN-AN process driving confidently into a climax on the downbeat of bar 6 (video example 7).

The reverse process takes place when the same music comes back after the middle section (video example 8). The music now begins on a forte dynamic level, with a strong IN-AN process. Note here the lower-level anacruses that create secondary accents, increasing the overall tension and forward drive of the passage. A similar process takes place in the second repetition, with even stronger lower-level anacruses occurring every two quavers. In the final repetition, we have something analogous to the very first presentation of the idea in bars 1–2, where the second half of the bar is hardly heard as the goal of the melodic idea, thus providing a large-scale closure to the piece.

Analysis of this kind enables performers to understand expressive content in terms of bodily movement, thus reproducing aspects of what great pianists of the past have themselves experienced during performance. But in addition to providing a tool for analysis of performance interpretation, this language might be used as a way of exploring musical expression in a computer-based, virtual environment. Through the arrow-based gestural language which models kinaesthetic processes users would be able to create their own interpretations by controlling the performance parameters of a deadpan performance of a chosen piece. Figure 10 shows how an inexpressive deadpan performance might look (10a), and how it would be possible to modify (e.g. by dragging the lines by means of a drawing tool) the strength, length and shape of gestural patterns in order to add expression (10b and c). The computer would then map these gestural patterns onto the corresponding D-T-patterns (by referring to matrices such as Figure 9), and play the music back with expressive shadings. Users would be able to modify these patterns repeatedly and hear the expressive result each time. Through this exploration process, one would become more con-

scious of the way bodily processes shape musical expression and gain better control of these processes when applied to real performance.[20]

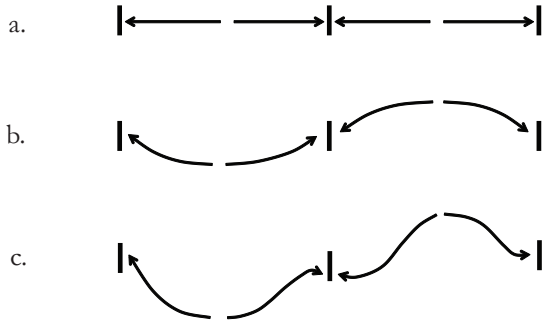

Figure 10: Exploring expression on a virtual instrument. a. Inexpressive deadpan performance; b. and c. adding expression through modifying the gestural patterns.

To conclude, what I presented was an outline of some analytical methods intended to address more closely the needs of performers. It is important to stress one more time the way these methods encourage performer-analysts not only to think more bodily in terms of gestural patterns but also to relate musical structure to the kinds of musical qualities directly related to the act of performance. In this way music theory is no longer irrelevant but plays an active role in cultivating the skills that are most useful to performers.

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20 For a discussion of various other computer-based attempts at modelling and controlling performance expression see Parncutt, *Accents and Expression in Piano Performance*.

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