Hearing through the Body: Expression and Movement in Music

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Declaration of Authorship

I, Georgios Papageorgiou,

hereby declare that this thesis and the work presented in it is entirely my own. Where I have consulted the work of others, this is always clearly stated.

Signed: ______________________

Date: ________________________

Abstract

This thesis engages with complex issues of musical expression and movement, and their relation, on the one hand, to musical structure and, on the other hand, to embodied musical experience. It aims to fill a gap in music theory and analysis: most methods overemphasise abstract conceptualisation of structural relations at the expense of the more dynamic, intuitive aspect of musical experience. As a solution, it offers a specific analytical method that can be used to explore dynamic aspects of music as experienced through the whole body.

Drawing mainly on nineteenth-century piano music, I analyse aspects of structure in both composition and performance in terms of expressive and motional qualities, revealing the relationship between musical and physical movement. Expressivity in music derives its meaning, at least partly, from the embodied experience of music: performers shape expression through their whole body while listeners react to it in a comparable way, albeit less overtly. Two related systems of graphic notation are introduced, which provide a non-verbal means of representing expressive movement and at the same time encourage an immediate, visceral relationship to the music. The first notation captures the animated quality of expressive movement by analogy with the motion of a bouncing ball, while the second breaks down the expressive musical flow into discrete gestural patterns of specific motional character.

While the ultimate value of this method lies in the analytical process it instigates, it also provides a novel theoretical framework that sheds light on the interaction, as well as integration, between structures such as metre, rhythm, harmony and voice-leading, which are traditionally studied mostly independently. In addition, it provides a useful tool for the study and communication of performance interpretation, based on data extracted from recordings in the form of tempo and dynamic fluctuation graphs.

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To my parents

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Introduction

"How does it come that when someone voluntarily listens to a song with ears and mind, he is also involuntarily turned toward it in such a way that his body responds with motions somehow similar to the song heard?"[1]

Educating musicians has traditionally involved providing a variety of different classes, all of which together aim at giving a well-rounded music education, balancing both theoretical and practical activities. As a result of the increasing specialisation in every academic field during the 20th century, the various components of music education have been assigned to different groups of music professionals, who have established such academic sub-disciplines as music theory, history, performance, composition, education, and even more specialised ones such as music psychology, etc. This is particularly true in the North American music academic tradition, which I am myself most familiar with, and which this research is mostly based on. While this specialisation has given rise to unquestionable positive advances in each field, a negative symptom of all this is that each subfield has tended to isolate itself from the rest, failing at times to look at music from different perspectives and benefit from the work of what have become in many cases competing fields of study. Music theory[2], for example, which is my main focus of study here, has been criticised on many occasions for having approached music from a largely ahistorical point of view, concerned only with the structure of notes.[3] At the same time, music theory, being traditionally a predominantly compositional theory, has neglected aspects of music relating to instrumental performance and dance, such as expression and movement. While to a lay person music is understood most of all as sound performed and danced to, to a music theorist music has traditionally been

[1] Boethius, *Fundamentals of Music*, p.8.

[2] In this thesis, by "music theory" I will refer to the tradition followed in North America, which has distinguished itself from (if not at times opposed) musicology, which studies music more from the historical and social point of view. My use of the words "traditional" or "conventional" music theory will point to an even more specific kind of theory, one that, since the decades after the second world war, has established itself as standard material for teaching purposes in college music departments: tonal harmony and counterpoint of the Fuxian/Schenkerian tradition, Schoenbergian formal theory and Fortean set theory and analysis.

[3] One of the first works that discusses the various limitations of music theory and the need for taking into account new post-structuralist modes of thinking was Kerman's *Contemplating Music* (British title, *Musicology*). Since then (1985) a growing number of scholars have dealt with the subject, which gradually helped music theory expand its horizons to new modes of thinking.

understood and theorised through the musical score as musical notes structured in specific ways.[4]

In recent decades, a parallel trend to specialisation has been that of interdisciplinary work, which has aimed not only at creating new combined subfields but also at minimising the above-mentioned negative effects of discipline isolation. Music theory, too, has made positive steps in moving away from the "Schenker and sets" monopoly of post-war North America, and exploring novel and more holistic ways of looking at the meaning of musical structure. These attempts include collaborations with psychologists, computer scientists, linguists, sociologists, and neuroscientists, as well as with musicians of different specialisms.[5] Of particular interest to me here are music theorists' attempts at addressing issues relating to music performance, by suggesting, among other things, how music theory can help performers improve their art. I am equally interested in how music theorists have claimed to help musicians in general to enrich and deepen their listening experience and musical understanding. There has always been an interesting antagonism between music theory and practice, which in recent days has led into a situation that is commonly referred to as the gap between music theory and practice: what I understand as a general miscommunication between theorists and performers as a result of their largely opposing ways of engaging with music—the first more consciously and intellectually and the second more intuitively and bodily. From the performers' point of view, music theory appears to be rather irrelevant to what they do. The majority of performers have difficulty seeing the value of studying music theory, whether it aims at cultivating general musicianship or improving their performance or interpretative skills.

My understanding of this gap of theory and practice is actually much broader than whatever disagreement music theorists and performers may have: it's about the questioning of the value of music theory, which may come not only from performers but from anyone, theorist or not, who struggles with compromising between a more conceptual kind of engagement with music and a more intuitive, bodily based one. While it is more acceptable that one who wants to learn how to compose tonal music, for example, has to go through the traditional harmony, counterpoint and formal theory training, it is less so as to the extent the study of music theory enhances, deepens or enriches the skill of musical listening and understanding, and by consequence, of performance. What stands as a barrier is the fact that the kind of hearing that

[4] See Cook, "Music as performance".
[5] This direction can be testified by the growing number of interdisciplinary music conferences announced as well as research projects undertaken.

conventional music-theoretical approaches encourage is distinctly different from the kind that is otherwise and intuitively known. This barrier or gap separates what Nicholas Cook calls "musical" versus "musicological" listening.[6] During musical listening one listens for aesthetic pleasure or understanding, while during musicological listening one listens to the various relations between discrete pitches (as seen in scores), which "arise only as a result of reflection *upon* music and notation *of* it."[7] For the musicologist, the starting point has traditionally been the musical score while "for the listener it [i.e. the score] simply does not exist."[8] And while engaging in such musicological exercises is not necessarily a bad thing in itself, it can be distracting to a lot of listeners, disrupting "the perceptual integration of the music that gives rise to the aesthetic experience. To listen to music too hard—to hear it in terms of its component sounds…is to risk not hearing it as music at all."[9]

Theoretical study of music is, of course, of many different kinds and of many different goals and it might therefore not be fair to criticise music theory for not achieving what it does not aim at. For a long time, particularly through the 18th and 19th centuries, music theory has been predominantly compositional in orientation, either trying to explain the structure of musical compositions or devise rules that help one write music. It was in more recent times (20th century) that music theory came to be seen also as a means for cultivating more general musicianship, including deepening music listening, or improving musical performance. When this shift in overall objective happened, however, together with the creation of comprehensive musicianship programs in modern music academies,[10] music theory was too slow in devising new tools for achieving these new goals. It mostly sufficed itself with adapting the already existing ones to the new needs. Thus, the same theories and methods that were designed to explain and teach composition (harmony, counterpoint and formal theories) were used with the assumption that they can also enhance one's ability to comprehend music better and listen more deeply. Music analysis and aural skills courses, for example, use concepts drawn from such compositional theories, ignoring that, as mentioned above, for listeners, score-based concepts are largely irrelevant to (or simply do not exist in) their musical experience. Similarly, the same score-based concepts and analytical techniques

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[6] See Cook, *Music, Imagination, and Culture*, pages 152-160.
[7] Serafine, *Music as Cognition*, p. 60 cited in Cook, *Music, Imagination, and Culture*, p. 155.
[8] Cook, *Music, Imagination, and Culture*, p. 156.
[9] Ibid., p. 159.
[10] The Comprehensive Musicianship system is considered an American technique and philosophy of teaching, which has spread to other parts of the world too. See Choksy et al, *Teaching Music in the Twenty-First Century*.

were used to develop tools which claimed to help performers improve their interpretational skills.[11] Even though the score is the starting point of most music making for performers too, the elements of music most relevant to them (that is, expression and gestural movement) are absent from most traditional music theoretical discourse.

This is particularly true in North American universities were the theoretical component within these comprehensive musicianship programs is often taught by research-trained professional music theorists. And even though music theory research in the last few decades has made solid steps in moving beyond the once monopolizing "Schenker and sets" trend, basic undergraduate theory has remained rather traditional, with Schenkerian and set theories having become integrated with basic harmony and analysis courses. (This comes as no surprise given the widespread study of such theories among music theorists and the fact that the compositional orientation of these theories integrates relatively easily with traditional harmony, counterpoint and analysis courses). At the research level, other more alternative theories and methods have recently been proposed but even when, in rare cases, they appear as undergraduate or graduate courses, their integration within the rest of the curriculum is far from a reality. What I mean by integration is not simply the addition of new courses or methods *next* to already existing ones but the modification of already existing ones in a way that takes into account the latest research. Some of this research includes, for example, music psychology experiments that either test the validity of speculative theories of music or discover new things about the way people perceive, experience or make sense of music. Particularly important are also some more recent attempts, such as those of the (British-based) *AHRC Research Centre for the History and Analysis of Recorded Music* (CHARM)[12] to move beyond the score-based analysis and promote the musicological study of recordings. After exploring a wide range of systematic approaches ranging from computational analysis to business history, CHARM was succeeded by the *AHRC Research Centre for Musical Performance as Creative Practice* (CMPCP),[13] which has refocused its interest in the musicological study of live musical performance, with particular emphasis on the creative music making and effective teaching, as well as on the embodied and socio-

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[11] Wallace Berry's *Musical Structure and Performance* is perhaps the most characteristic work that makes use of a variety of traditional theoretical approaches with the aim of illuminating musical meaning and performance. Very characteristic among recent theorising is also the use of Schenkerian theory and analysis for performance purposes, a case of a theory whose main aim is to explain the organic unity of the structure of musical works. While compositional structure does have direct influence on performance, analytical techniques designed for *explaining* aspects of compositional structure cannot automatically be used effectively for other purposes, such as helping one perform better.

[12] http://www.charm.kcl.ac.uk/index.html (last accessed on 24 Nov 2010).

[13] http://www.cmpcp.ac.uk/index.html (last accessed on 24 Nov 2010).

cultural meaning of music. Even broader in scope have been the collaborative projects within the research cluster, *Creative Processes in the Performing Arts* (CPPA), whose subject areas include dance and drama in addition to music, always with the aim of pursuing "creative inquiry and critical analysis at the intersection of theory and performance practice".[14]

And while we can only wait and see the results of such research programs, integrating these findings for teaching purposes is another story, which is one of my main concerns in this thesis.[15] In particular, I am interested in the performative aspect of music theory and analysis,[16] the way the process of thinking about or analysing music *changes* the way one experiences music. I don't see theoretical or other kinds of study of music as merely (and neutrally) *enriching* one's experience or ability to comprehend music, but as *molding* the manner of experiencing music in specific ways, depending on the kind of engagement with music encouraged by the analytical processes. The way music theorists have generally defended their methods of analysis for the purpose of cultivating general musicianship is that even though some of these methods and concepts may look a bit abstract and not at first sight directly related to one's intuitive way of experiencing music, they nevertheless *somehow* enrich the overall experience. What is not stated is that such methods of analysis may change our ways of experiencing music in ways many would find undesirable or unadvisable. I remember how during my music postgraduate studies in an American university—where I had to teach aural skills classes involving among other things identifying harmonic progressions—my ability to comprehend and enjoy music at a concert at that time was often depressingly compromised: without even realising it or making any particular effort, having been engaged in predominantly intellectual kind of engagement with music during that time—and a lot of aural chord progression identification—all I caught myself doing at concerts was just identifying chord progressions in the pieces I heard as if there wasn't anything else to hear or that this resulted in any enrichment of my overall experience at all!

This raises important issues of music theory pedagogy, music psychology and politics of education, only some of which, and only in passing, I can hope to explore here. What is pedagogically good or desirable for different people is a very tricky

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[14] More information about this research project can be found at http://www.wlv.ac.uk/default.aspx?page=12790 (last accessed on 24 Nov 2010).

[15] Especially encouraging is the fact that "the work of the research cluster [CPPA mentioned above] supports the University of Wolverhampton's undergraduate and postgraduate curriculum with an emphasis on the continuous updating of [its] taught curriculum in line with research findings."

[16] For issues relating to the performativity of music theory and analysis see Cook, "Epistemologies of music theory", and "Analysing performance".

question to answer. So is the question of how much and what kind of theory is necessary or advisable for developing good musicians. Is there enough evidence to convincingly argue in favour of certain methods and, if not, what and whose criteria should one use in designing curricula? To what extent are the different methods of analysis used today in classrooms there as a result of complex power structure relations among music theorists? Can the dominance of certain kinds of methods be seen as a conscious attempt to marginalize others? To what extent is the domination of science-like methods[17] the result of a prejudice against methods that appear insufficiently "scientific", such as those that emphasize bodily or subjective, rather than conceptual or objective, meaning?[18] Can this be seen as responsible for the gap between theory and practice? What prevents an effective and balanced integration of different kinds of teaching approaches and methods?

While I do not intend here to provide answers to all of these questions, it's not difficult to observe a general imbalance and dichotomy between two modes of talking about or experiencing music: the more mind-based, intellectual kind of experience on the one hand, and the more bodily-based or intuitive one on the other.[19] Put in more gendered terms, as Fred Maus described it in his 1993 article "Masculine discourse in Music Theory", these can be seen as the "masculine" as opposed to "feminine" discourse, where the more "feminine"—that is, more personal, qualitative, experiential, empathetic or bodily based—discourse has been largely marginalized by the more masculine—quantitative, impersonal, rule-bound. According to Maus, one of the reasons for this marginalization is the male-dominated music theory community's aspiration to masculinity, their desire to project a more masculine self-image, to themselves (their first readers) and to other readers.[20] "The *omissions*," in other words, "that characterize much contemporary theoretical writing reflect a desire to avoid *discourse that might seem unmanly*."[21] If this is true, and as we have gradually moved into a less masculine-dominated society, this music theory discourse imbalance will need to be restored. After all, the latest neuroscience research has challenged this separation of thinking and bodily

[17] Here I am referring to the positivist music theory tradition of post war America influenced by the writings of Milton Babbitt, who consciously strove to give a scientific image to music theory by encouraging the use of scientific methods (and yet he set out the principles of a performative approach to analysis—see Cook, "Epistemologies".) This influence can be seen not only in the atonal theoretical tradition but also in the way tonal theory, particularly Schenkerian theory, was recast in more "scientific" terms.

[18] The eurhythmics-inspired work of Alexandra Pierce (1994, 2007) is a typical example of such bodily-based teaching methods.

[19] See Doğantan, "In the beginning was gesture".

[20] Maus, "Masculine discourse in Music Theory", p. 266.

[21] Ibid., p. 265.

processes by showing how "cognitive processes are fully embodied" and that "it is through our bodies that we perceive, experience and come to know the world".[22] While musicology has begun to explore the implications of this research,[23] more needs to be done particularly in the field of theory pedagogy, so that more practical methods of analysis are made available which promote a more embodied musical thinking and experiencing. It is my conviction that music is experienced more fully and understood more deeply (i.e. comprehension as well enjoyment is enhanced) when both the mind and body work together in an integrated way. My ultimate goal in this thesis is therefore to propose a new method of analysis that integrates score-based structural analysis with a more intuitive, bodily-orientated approach. In doing so, it will help whoever wishes to use the method, to explore the music in such a way that the score-based structural aspects of music are intuited in terms of bodily-experienced expressive movement.

What motivated this work was, on the one hand, a personal need to explore more the expressive, motional qualities of music that I was particularly interested in and sensitive to, and on the other hand, a lack of the necessary tools that would allow me to do so. This need was intensified after I entered a postgraduate music theory program in a North American university, where the nature of the kind of music theory emphasised was gradually changing the way I experienced music in ways that did not please me: while I was used to experiencing music more with my whole body, by attending to the more dynamic qualities of music, I found myself being encouraged to experience music more and more through the mind alone in such ways that the two experiences weren't coming together or reinforcing one another into one unified musical experience. While interesting and intellectually satisfying, the kind of theory and structural analysis taught there was drawing me into a kind of experience of music that was way too abstract and which I found it difficult to relate to musical concerns. I had to make particular effort to see the connection (if any) between the more intellectual and the more bodily experiences and it is the need to discover this connection that gradually led to the present research. This was an attempt, at the same time, to test the value of mainstream music theory, which to me, should lie in its ability to engage in an integrated way both one's psychophysical and intellectual world.

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[22] Doğantan, "In the beginning was gesture", p. 244. See also Johnson, *The Meaning of the Body*.

[23] Building on the work of Lakoff and Johnson (1980) and Johnson (1987) a number of theorists have tried to explain our musical experience in terms of bodily image schemas. See for example, Brower, "A cognitive theory of musical meaning", Cox, "The mimetic hypothesis", Saslaw, "Forces, containers, and paths" and Zbikowski, "Conceptual models and cross-domain mapping".

While many of my music theory colleagues did not seem to share my own personal frustration with the dichotomy between these two kinds of experiencing or "hearing" music, many non-theorists did. Only their frustration was a bit different: while I believed in both kinds of experiences, most non-theorists (mostly performance students or instructors) would simply ignore or even reject theory altogether. Apart from having to take the required theory classes to complete their degrees, few would seem to appreciate and incorporate theory into their daily engagement with music. This was particularly true with most performers I happened to talk to, whose engagement with music was more bodily and instinctive rather than conceptual: they not only didn't seem to find theory of much help to what they did, but at times found that it got in the way of their spontaneity and intuitive manner of thinking. It's one thing to *know* details about the harmonic, rhythmic or formal structure of the score and another to play (or hear) it meaningfully. To what extent the former (or the process of reaching to that knowledge) helps the latter is not that obvious, and different theory teachers or tools do a better job than others in making that link possible.

But even when it comes to teaching theory for the purpose of writing tonal music, for example, I find that there is still something important missing from many of the teaching approaches. While learning the rules of harmony and voice-leading, phrase and formal structure is an important step in model tonal composition, there is still a big gap between applying rules or following structural models correctly and writing good music. While the most talented students will somehow eventually fill in this gap, internalise the rules and move successfully to good music writing, the less talented ones will lag behind. What is this something that makes good musical compositions expressively meaningful and, most importantly, what skills are required in order to achieve that and how does one teach those skills? Does expression follow the compositional act as a result of performance, or is it something that composers conceive together with or even before the notes? How are musical ideas conceived or imagined in the composer's head or body and how are they translated into notes? How does one teach writing down notes rich in meaning and expressive power? It is my belief that the problem lies in the fact that structure and expression, two closely interrelated aspects of music, have not traditionally been theorised and conceptualised as one unified entity. Instead, the main preoccupation of traditional theory has been musical structure, leaving expression either largely unexplored or treated as something subsidiary—something that comes after the structure, mostly as a result of performance. The compositional process suggested by most traditional tonal composition classes does not integrate aspects of musical expression, which are generally thought of as something that performers will add later during the performing process. Having eliminated musical expression and dynamic movement, the compositional process tends to be more of an abstract conceptual exercise in applying rules and procedures that run the risk of resulting in lifeless musical compositions. What is not recognised is that the acts of composing and performing are two closely related activities of the reverse order, whose common ground needs to be found: composers translate imagined sound (which includes expression) into notes and performers turn written down notes into heard (expressive) sound. The skills therefore required to do either activity have something very important in common and that is, as I will argue, the ability to intuit both structure and expression through both the mind and the body in an integrated way. Even though many of the existing educational approaches do emphasise providing students with a variety of skills, including performance and composition skills, the degree of their integration remains relatively low.

One of the aims therefore of this work will be to propose ways of successfully thinking or hearing through both the mind and body so that structure and expression are grasped in a more unified way. It's an attempt, at the same time, to bridge the gap between theory and practice, which in broad terms could be understood in relation to the mind/body and structure/expression dichotomies. In prosing solutions to the problem, I focus more on the theorists' side, assuming that it is theory that needs to adjust in order to reach performers and bridge the gap. My belief is that music theory, which assumes a major general educational role in the modern music academy, needs to look more closely at the needs of practicing musicians with the goal of providing more performer- and listener-friendly teaching tools. Music education can greatly benefit from a close cooperation and effective communication between the different sub-disciplines of music. To me, that means finding the common ground between these different disciplines by integrating the various different kinds of activities or needs of musicians.

Despite the fact that my focus in chapter 1 is on the performer-theorist dichotomy, it essentially provides an introduction to the more general dichotomies between the mind and body or conceptual and intuitive approaches to music. An average music listener (i.e. someone with no formal musical training) can relate to and communicate in a more direct and effortless way with a performer (during a live or recorded performance) than with a theorist or composer (through a lecture, a musicological essay or a musical score). The strong link between the two can be located in the immediacy of the experienced sound as well as in the more intuitive manner of engaging with music. By contrast, theorists tend to emphasise a more conceptual approach, where musical meaning does not necessarily need to be searched in the musical sound itself or the way one bodily experiences this sound. As a result, another difference between these two modes of music engagement is that performers or listeners process musical meaning in real time in contrast to theorists who tend to do so out of real time; a theorist, in other words, can spend hours pondering on the abstract relation between two chords in succession or non-succession, while a performer or listener is generally interested only in the meaning of these two chords as they are experienced in a real-time sequence. (Since abstract theoretical meaning does not always describe or relate in a direct way to the real-time experiential meaning of music, those who have more interest in real-time experience may find this irrelevant.) Composers, on the other hand, can be thought of as lying close to either mode of engaging with music: while there are all kinds of approaches to composition, particularly in the 20th and 21st centuries, the classic process of composing tonal music involves partly an improvisational process (i.e. writing music on the piano or imagining the music in real time before writing down) and partly a more conceptual one where the music is reworked and structured on paper by invoking established theoretical/compositional rules and procedures. My interest here is mostly how in searching for effective theoretical models of teaching model tonal compositions, theorists often overlook the importance of the more intuitive approach, the ability to imagine (or improvise) the music first and then transfer it down as notes rather than begin with abstract conceptual compositional processes.

Looking more closely at the way performers engage with music teaches us important things about the bodily component of the way people in general experience music. Another way to do so would be to look more closely at the way dancers move to and experience music. This bodily reaction to music is directly linked to our real-time, intuitive engagement with music and is a good measure of a crucial aspect of our perceived expression of music. As I will argue in chapter 3, our experience of musical expression as movement is not a mere metaphorical construct or the sole product of imagination but a real physical one: as we listen to music, our bodies react to (while becoming the perceptual organs of) the dynamic/rhythmic and expressive qualities of music, through movement that ranges from subtle internal muscle contractions to more overt limb movements. To communicate this experience, I will propose two related analytical notations that will describe expressive movement as gestural process. The goal of this gestural language will be to raise to a more conscious, conceptual level what is already experienced at a more subconscious, intuitive level. This will not only provide a concrete means of communicating musical expression but it will also help to cultivate a more bodily engagement with music. At the same time, this gestural language will also provide an effective link not only between expression and movement, but also between musical structure and movement. Traditional musical structural concepts will be linked directly to this gestural language so that structural function can be grasped in more bodily (and therefore, direct) terms.[24]

As already noted, one of my aims will be to link together or integrate within a single analytical language as many musical concepts and activities as possible, hoping to provide a more complete account of musical experience. At the same time, I aim at exploring the relation and interaction between the activities of composing, performing, listening and theorising: what's common between all of these activities and how does the study of one can help illuminate the other? In designing teaching methods for composition, for example, one has to take into account the fact that the composing act is similar in many ways to the performing or listening acts, in the sense that, before they write down notes, most composers internally listen to (imagine) sounds in real time, which is at the same time an internal kind of performance. Similarly, in understanding a listener's experience, one has to take into account the fact that an important part of a listener's act involves empathising with the performer's physical act of performing. Finally, a performer needs to be able both to connect with the composer's score or conception and to communicate with the listener. As we will see in chapters 3 and 4, the notes that performers read and play from a score, for example, are not neutral material that can be given any expressive shape desired. The structure of these notes can be thought of as possessing a certain expressive power that influences in different ways the interpretative choices of performers. This expressive power (which I will refer to as "expressive potential") does not constrain the artistic job of performers in a negative way but needs to be fully sensed and physically grasped by them in order for a convincing interpretation to be achieved. Part of the goal of the method that I will propose is to help anyone who wants to play a score to uncover and gain an embodied awareness of this expressive potential of the score. Given that the body is an important and active means of

[24] There has been a rapidly growing interest in theorising musical gesture in recent years. While the importance of the musical body in shaping musical meaning is generally acknowledged in this work, the term "gesture" has come to be used very loosely, often having no discernible or at least substantive relationship with the body, which is my focus here. Among the most seminal studies in this field are David Lidov's "Mind and body in music" and a more recent monograph by Robert Hatten, *Interpreting Musical Gestures.* Three international conferences (2003, 2006 and 2010) on musical gesture have resulted so far in two interdisciplinary collections of essays on the subject, edited by Anthony Gritten and Elaine King, *Music and Gesture* and *New Perspectives on Music and Gesture.* For another similar recent collection, which explores bodily gesture in great detail, see Godøy and Leman, *Musical Gestures: Sound, Movement, and Meaning.*

shaping a performance interpretation, the expressive power of musical structure would best be communicated to performers through a more body-gestural analytical language.

On the other hand, at the level of theorising musical structure, my aim is to explore the interaction between the various structural aspects of music traditionally theorised to a large extent independently (harmony, rhythm, meter, melody, form etc.) and the way they contribute to some total unified musical experience. The problem is that, as I will attempt to show in chapter 2, the way these structures are traditionally theorised militates against their effective integration. This is at the same time one of the reasons why much traditional theory has relatively low communicative power with performers or listeners, who generally have more interest in this total musical experience rather than its independent structural components. When one's main interest, for example, is musical expression, one needs analytical techniques that have the ability to look at the contribution of structure within some integrative and unified totality. This is not to say that structure should not be broken down to its component parts, but that when their structural meaning is theorised in relation to one's listening experience, the interdependence and integration of those parts is very important. What I wish to investigate in the coming chapters, therefore, is to what extent independent structural components can be meaningfully related to one's total listening experience and, particularly, to a more bodily-based experience. Are there ways to conceptualise or hear structural components in such a way that they can be synthesised in some total listening experience? As I will argue, much traditional theorising of structure lacks this integrative goal. The result is that the theoretical models and analytical languages used for each structural component are at times so different that they cannot communicate with and inform each other effectively.

The evaluation of these theories in relation to their ability to synthesise and communicate the more dynamic aspects of musical experience will take place in chapter 2. The focus will be the most representative theories and analytical methods taught at US universities today, which cover basic structural aspects such as rhythm, meter, harmony, voice-leading, phrase and melodic structure. My choice of music theory as taught mainly in the US can be explained by the fact that this is the theory that I am personally most familiar with, given my undergraduate and graduate studies in American universities, and the one that I find the most abstract and alienating to most music students. This kind of theory is generally taught in basic undergraduate but also graduate theory courses and plays a decisive role in how music students end up conceptualising music. It also forms the basis of methods used for developing certain general musicianship skills such as aural, keyboard, model composition and listening skills. The same concept of Roman Numeral analysis used in harmony classes, for example, is also used for learning to write tonal music, for aural training, keyboard playing or formal analysis. Similarly, thesame theoretical models of structure also become the basis for analysis for the purpose of informing performance interpretation. In short, regardless of what the original intention or explanatory value of various theories of musical structure is, in teaching practice these theories also form the foundation for methods used for a variety of pedagogical goals. While it may often be an advantage that an already existing theoretical model can be recycled for different purposes, it is at times a problem, when a specific aspect of music presents particular problems and appears to demand special treatment.

How well such theories can adapt or have been adapted for various pedagogical purposes is an important question. One of the main issues that will preoccupy me in chapter 2 will be the pedagogical consequences of theorising the structural meaning of pitch (harmonic, voice-leading, melodic, etc.) apart from meter and rhythm, and of musical structure in general outside some imagined or performed context of the musical score. One characteristic example of such theorising, which I will spend significant time evaluating, is Schenkerian theory and analysis. What interests me in relation to Schenker's approach is not so much its various stages of development throughout Schenker's life, or its various interpretations and practices by later theorists, but the ability of certain basic concepts and practices, as has become established practice in today's American universities, to relate to the more dynamic aspects of musical experience. One of them, for example, is the graphic notation invented by Schenker, whose arrhythmic nature does not appear to be well-suited for conveying this more dynamic or rhythmic nature of music. Despite attempts by Schenker, especially in his early writings, to make a connection between musical structure and life forces, the very nature of the basic concepts and symbols of his method, as well as the highly metaphorical language he often used, make it difficult for analysts to relate them to their more bodily experience of music. Later attempts at suggesting how Schenkerian graphs can be related to such a bodily experience are rare and haven't always been met with much enthusiasm.[25] What might be needed, if someone's interest is to adapt Schenkerian

[25] See particularly Alexandra Pierce's "Developing Schenkerian hearing and performing" and *Deepening Musical Performance through Movement*. Steve Larson's theory of "musical forces" is also related to Schenkerian hearing in many of his writings. See especially his "Musical forces and melodic patterns", "Musical forces and melodic expectations", "Musical gesture and musical forces" and *Schenkerian Analysis—Pattern, Form, Expressive Meaning*. Despite scepticism as to the extent in which the Schenkerian approach can be directly useful in performance pedagogy, many performers seem to benefit from it in different ways. A notable example is the renowned pianist Murray Perahia whose concern for the

or other kinds of analytic methods to specific pedagogical purposes, is perhaps not a different interpretation or refocusing of the method but the actual modification or even elimination of those aspects that are seen as an obstacle to achieving the desired goals. This is in fact part of what I do in chapter 2, where in addition to evaluating the ability of certain methods to relate to one's bodily experience of music, I experiment with modifying Schenkerian notation while reprioritising the criteria used. While my ultimate goal is to propose an original method with its own unique graphic system and theoretical foundation, I do not wish to give the impression that this method has come to existence out of nowhere. It is, rather, in many ways an integration (direct or indirect) or transformation of elements from previously existing methods, the result of having observed the limits of other methods and carefully avoided their most problematic aspects.

At the centre of this integrative attempt lies the idea of gestural process, which provides the link between note structures on the one hand and expressive movement on the other. As I will argue in chapter 3, bodily movement plays a crucial role in the perception and experience of musical expression as gestural movement. The graphic representations that I will use to capture gestural process or expressive movement are therefore based on our bodily movement, and as such integrate elements of speed, tension and relaxation, gravitation, space location and goal direction. These same elements are translated directly into music theoretical concepts, which are integrated accordingly into a unified music theoretical framework of musical structure. The crucial element of this unified theoretical framework is the integration of space and time, or of spatial and temporal representations of musical structure: the same way that physical movement is understood as motion in real space-time, musical movement is understood in a corresponding *musical* space-time, where the concepts of meter and rhythm, which involve the temporal aspects of structure, are integrated with concepts used to understand pitch structure. Models of structure that rely on a static two-dimensional representation (such as those explaining chord relations in some imaginary harmonic space)[26] are unified with those that make use of temporal frameworks (such as representations of the metric structure of music). Harmonic tension and tonal centricity, for example, are

bigger picture in performance is reflected in his knowledge of Schenker's writings. See Perahia, "Some thoughts on the Goldberg Variations" (2000).

[26] One of the first representations of harmonic relations through space diagrams is Heinichen's "musical circle" from his 1711 treatise "Neu erfundene und gründliche Anweisung", reproduced in Barnett "Tonal organization in seventeenth-century musical theory", p.445. More complex later representations include Oettingen's diagram of tonal space from his "Harmoniesystem" (1866), Weber's chart of key relationships from "Versuch" (1817-21) and Schoenberg's "Chart of Regions" from *Structural Functions of Harmony* (1948). See Bernstein, "Nineteenth-century harmonic theory".

conceptualised within a temporal/metric framework in such a way as to take on the meaning of some living force that creates directed motion. This living force, the expressive power of the music, creates the feeling of musical motion, which for listeners is not a mere metaphorical notion but a real physical experience that can range from the internal urge to move to an actual or imaginary movement to the music.

How this integrative process works is made clearer in chapters 4 and 5, which explain in detail how the various structural components of a musical piece contribute to the overall bodily experience of music. In contrast to most traditional theories of music, here I define the structure of music in terms of both the musical score and the way it is performed. In other words, I analyse both the musical score and information about the way the score is performed. (For this purpose I extract information from recordings in the form of tempo and dynamic fluctuation graphs.) This acknowledges the importance of the role of the performer in shaping musical meaning or the way one imagines the music as sound. The tendency in traditional musical analysis is to process the compositional structure and the performance of a piece in two separate stages rather than in a single integrated one. So even when the process of analysis may involve several hearings of a performance of a piece of music, the actual process of score analysis, which is heavily conceptually driven, does not normally require a systematic (if any) consideration of the way structure is heard, performed or bodily intuited. This is exactly the kind of structural meaning that I wish to illuminate further by emphasising the importance of grasping musical meaning as experienced sound. The kind of analysis I propose, therefore, encourages one to search for structural meaning directly through experienced sound, focusing particularly on embodied meaning. The same language (the gestural analytic language I referred to above) is used to describe not only score and performance structures but also the various independent structural components of each. The way the structural meaning of a durational pattern is described, for example, is the same as that of a harmonic pattern or the way a performer shapes the tempo of a specific passage. In every case, the focus is on how each structural pattern contributes to the total gestural experience. The result is a smooth connection between score, performance and embodied sound experience. This allows one not only to consider the interaction between various structural components—that is, how the meaning of each influences or is influenced by some other pattern—but also to eventually "calculate" the total structural sum.

My use of mathematical language above (referring to the calculation of the total sum) is not purely metaphorical, since my approach in these two chapters is on purpose partly quantitative. Very important in the experience of music is not only which kind of expressive gesture is experienced but also its particular shape and strength. The more structural factors coincide to shape an anacrustic gesture, for example, the more strongly its driving force will be experienced. Quantitative measurements are especially crucial in assessing the contribution of the way the notes are performed, where subtle changes in tempo or dynamic values have profound importance for the experienced expressive effect. Part of the methodology I use is a semi-formal rule system that helps to determine both the qualitative contribution (what type of gesture) and the quantitative contribution (the strength of each gesture) of each structural component. This rule system is not meant to be used as a substitute to the analyst's judgment, but rather as a conceptual guide to the process of analysis. It suggests how various isolated structural patterns might be experienced, so encouraging the user to focus more on the dynamic, gestural aspect of music. This rule system is partly based on my own personal observations and partly on observations by others, as documented in published research literature, but in the end, what matters is users' own observations and ultimate sensitisation of their mind-bodies in experiencing the gestural properties of music.

As presented in chapters 3-5, the method I propose is not readily accessible for teaching purposes. Here I present only the general theoretical framework, two related analytic notations, and some analytical insights they afford. They are basically the results of my own self-exploration with the music. A lot of what I say is presented in the order I followed during my own discovery process in order to highlight the importance of the analytical process rather than the analytical product. Behind this order of presentation, one can therefore read a lot about my assumptions, what I consider important and what my goals are. At the same time, it provides a model of how one may go about exploring meaning in music. However, it is in the epilogue that I say more about how the method I propose might be used for different teaching purposes, and about its pedagogical value. One of the main difficulties in using this method is the nature of the graphic representations, which may look more complex than most people might be willing to draw by hand. In fact, as presented here through graphs, the bouncing ball representation is hardly practical for use. However, as I explain in the epilogue, it has the potential of becoming a highly effective pedagogical tool when implemented as a computer program that allows one very easily to create bouncing ball animations moving in synchrony to the music. Although the second graphic representation—the arrow notation—can more easily be drawn by hand, its effectiveness could similarly multiply when controlled through a computer program as well.

Finally, I would like to say a word about where I see the place of the proposed method in relation to other methods of analysis as well as whom I think this work might be of most interest or will be of greatest value to. Given the integrative claims I make about the method and the suggestions for modification of other methods, I should warn the reader against understanding my work as an attempt at replacing other methods. While it integrates many elements from other theories and methods, its aims are for the most part different from a lot of these other theories: having an explicit pedagogical goal, it aims at cultivating a more bodily kind of hearing, achieved by exploring structural meaning by means of a gestural analytical language that provides an effective link between abstract note structures and bodily musical experience. For different people with different goals, therefore, not all methods will be equally valuable. Nevertheless, it is my conviction that engaging with music in a way that balances the role of the body and mind, as my own method attempts, maximises musical understanding and enjoyment.

Given the pedagogical goal that underlies my work, the content of this thesis will therefore be of most interest to anyone wishing to explore aspects of teaching music that integrate thinking and hearing through both the mind and body. At the more theoretical, research level, it could be of interest to those interested in an integrative conceptual framework to understand the way the various structural components of music relate to the embodied aspects of composing, performing and hearing. At the more practical, pedagogical level, it may be of interest to music theory teachers wishing to experiment with the proposed analytical methods, either in the context of a more traditional music analysis class where tonal harmony, rhythm and form is taught or in a performance studies class where the focus is more the analysis of performance interpretation, or even more ideally a class aiming at exploring the creative integration of the acts of composing, performing and theorising of the embodied meaning of music. Finally, this work could be of interest to researches whose field lies at the intersection with, or even outside, music, such as (music) psychologists who wish to empirically test a number of my hypothesis stated here, or computer scientists wishing to use the ideas presented here implement various computer applications for teaching purposes, some of which are suggested in the epilogue.

CHAPTER 1

The Gap between Theory and Practice

Music theory and practice today can be understood both as two complementary and, at the same time, as two opposing ways of engaging with music. Early study of music, such as learning to play an instrument, normally involves the study of basic music theory as well, which is considered essential not only for reading the musical score but also for understanding basic music structural concepts. At later stages in the study of music, theory and practice no longer seem so dependent on each other, such as when one can study music theory without necessarily continuing to play or study an instrument. In fact, at this more advanced level of music study, theory and practice can often feel opposed to each other, as reflected in the often polemical relationship between music theorists and performers.[27] The kind of opposition I want to focus on here is not necessarily that between two groups of professionals—after all, music theorists are often performers and vice versa—but between two different ways of engaging with music that could roughly be considered as representing the disciplines of music theory and practice: on the one hand, we have the more intellectual, conceptual kind of engagement with music and, on the other, the more instinctive, intuitive or bodily-based one. While there is nothing inherently bad about either kind of engagement with music, the gap between the two (the mind/body dichotomy) and the inability to integrate them in a way that maximises musical experience and learning is what concerns me the most here. Part of what I want to show in this chapter, but also in the whole thesis, is that there is nothing inherently opposing between theoretical and practical approaches to music and that it is possible by using the appropriate teaching methods to bring them closer together. To do so, I will first need to examine a bit closer some of the causes of this gap or dichotomy, then see a number of attempts at directly or indirectly eliminating the problem, and finally say a few things about my own approach to the solution, which will be elaborated in later chapters.

[27] See Howell, "Analysis and Performance".

1.1 The conflict between theorists and performers

The gap between theory and practice can be observed most vividly in the music conservatory/academy, where behind the most apparent and practical issue of communication and cooperation between the opposing groups lie issues of power struggle. Who is the authority on various musical matters and where do the boundaries of one's territory stop and the other's begin? Who is the "real" musician and what is the best way of educating tomorrow's musicians? In practice, it is music theory that is often questioned for its value in the educational system, both from within the music theory community and from performers. It is music theorists that constantly feel the need of defending the value of their work within the general music field, and it is mostly music theorists that need to address the problem of this gap and search for a solution.

This tension between performers and theorists has been present since antiquity. For a long time, up until the middle ages, before musical practice rose to relative prominence, it was, according to Guido, the music theorist (*musicus*) who was considered the "true" musician as opposed to the performer (*cantor*), an ignorant who could only sing the notes.[28] Originally a purely speculative discipline, music theory gradually became more and more practical in its orientation, since, as musical practice was developing, it had to solve real practical problems such as those of notation and tuning, as well as assume the important role of educating both performers and composers. "This is by no means to say", to use Thomas Christensen's words, "that 'speculative' knowledge of music was [now] in complete disrepute; such knowledge was valued, but mainly to the extent that it could be of value to *musica practica*. The true *musicus* of the later Middle Ages was now the 'cantor peritus et perfectus'—one who not only knew, but could do, to turn Guido's aphorism on its head". [29]

With the renewed interest in ancient Greek theory in the latter half of the 15th century, the gap between the practical and speculative music theory began to get even more pronounced: while a significant part of music theory treatises managed to integrate music theory and practice by bending music theory in the service of practice,[30] one other part became even more distanced from practice. This was particularly apparent during the scientific revolution of the late 16th and early 17th centuries, when several music theoretical issues were now appropriated by the disciplines of natural science, so that by

[28] See Bower, "The transmission of ancient theory into the Middle Ages", p. 152.
[29] Christensen, "Introduction" to *The Cambridge History of Western Music Theory,* p. 6.
[30] Ibid., pp. 7ff. Examples of such theorists include Zarlino, Salinas, Gerone, Mersene, Rameau, and later, Forkel and Weber.

the18th century speculative music theory had lost its former glory, while at the same time suffered a number of serious criticisms. Among such critics was was Johann Mattheson (1681-1764), "who would lambaste music *theoria* (or as he preferred to call it, 'musical mathematics') as a discredited remnant of unenlightened prejudice, its advocates as system builder blindly—or deafly—constructing their elaborate numerical edifices with no regard to musical reality".[31]

Even though music theory changed a lot since the 18th century, this criticism by Mattheson applies to a large extent to contemporary American music theory as well, which can similarly be seen as having been distanced from more practical or pedagogical concerns, and instead gives the impression of being engaged in self-indulging exercises of the intellect. Crucial turning points in the history of contemporary music theory was the founding of the Journal of Music Theory in 1957 and of the Society of Music Theory in 1977, both of which can be seen as attempts at professionalising music theory, as well as splitting itself "off from the American Society for University Composers, and more particularly from the American Musicological Society".[32] These events were at the same time acts of rejection, and definition of "themselves against, the 'mere' theory pedagogue", whose prestige had declined by the beginning of the 20th century: the goal was, in McCreless words, to "treat music theory as a legitimate academic discipline rather than as a service discipline for conservatories and university music schools".[33]

The result was that music theory reached high levels of specialisation and prestige, something that, as Tim Howell put it, led to "a somewhat polarized view of the roles of analysts and performers in their approach to music—analysts investigate, performers present".[34] This, as Howell explains, has had a polemical side to it, one that finds performers accusing analysts of doing what they do only because they can't perform. In other words, "he who can, performs, he who cannot, teaches".[35] Performers do not appear impressed by the complexity of the theories and techniques devised by theorists, but find them highly irrelevant (to them at least), if not misguiding. Theorists, on the other hand, have accumulated enough power and self-confidence to even dare suggest how performers *should* play the music. This was not taken very favourably by performers, especially since the approaches of some of the earliest works in analysis and

[31] Ibid., p. 8. Representative theorists during the "scientific revolution" of the 16th and early 17th centuries include Zarlino, Fludd, Keppler and Newton, all of which were influenced by the rediscovery of the ancient Greek harmonics tradition.
[32] McCreless, "Contemporary music theory and the new musicology: An introduction".
[33] Ibid.
[34] Howell, "Analysis and performance", p. 692.
[35] Ibid,. p.693.

performance (such as Berry's and Narmour's) give the impression that they "are not there to 'direct' the performer, but to dictate to him".[36] Since then many other approaches have appeared, which minimised these early authoritarian tendencies (see below for further discussion of such approaches).

And while this rather recent preoccupation with performance matters may be thought of as a positive step in bridging the gap between theory and practice—in the sense that it at least shows an effort to address the needs of performers— it, at times, seems to be the cause of a greater widening of this gap. This makes sense if we consider how fundamentally different the assumptions behind the approaches to performance of many theorists and performers are. At the extreme end of the theory world lies the idea that the meaning of a piece of music lies in the notes as written down on paper by the composer, and the job of performers is, once they discover it, to convey or express it in performance.[37] At the centre of this activity lies the idea of structure (here meaning the structure of the notes of the score), which for many theorists is synonymous with musical meaning. Expressive variables observed in performance, i.e. variations in tempo and dynamics, are even considered by many as nothing but a manifestation of the attempt of performers to convey or clarify this structure. This line of thinking goes back to Schenker who, according to Rothstein, "did not consider himself an 'interpreter' in anything like the usual sense of that word. To his way of thinking, performance is the means of making audible that which is already objectively there in the work."[38] For Schenker "performance directions are fundamentally superfluous, since the composition itself expresses everything that is necessary".[39] Similarly, Erwin Stein, following Roger Session's writings, argued that "It is the structure of music, resulting from its melodic, harmonic, rhythmical and dynamic components, that determines form and character at the same time. The character is given by the structure. In fully realising the second… [the performer] must take account of the features of the structure and, in combining them, decide their precedence according to his sense of proportion and judgement of

[36] Ibid,. p.697.
[37] This text-based orientation of traditional musicology and theory and how it hampers thinking about music as a performance art is discussed by Nicholas Cook, "Between process and product". Characteristic of this tradition are aphorisms (cited in Cook) credited to famous musicians such as Schoenberg, who is supposed to have said that "The performer, for all his intolerable arrogance, is totally unnecessary except as his interpretations make the music understandable to an audience unfortunate enough not to be able to read it in print" (see Newlin, *Schoenberg Remembered*, p. 164.); or Leonard Bernstein's injunction that the conductor "be humble before the composer; that he never interpose himself between the music and the audience; that all his efforts, however strenuous or glamorous, be made in the service of the composer's meaning" (see Bernstein, *The Joy of Music*, p.56.)
[38] Rothstein, "Heinrich Schenker as an interpreter of Beethoven's Piano Sonatas", p. 10.
[39] Cited in Rothstein, "Heinrich Schenker as an interpreter of Beethoven's Piano Sonatas", p. 5.

balance."[40] Even when it is acknowledged, as in Stein's case, that performers do have a say in this whole process, the general impression one gets is that the approach of the above-mentioned theorists heavily underestimates the importance of the role of performers as equal partners in the creative process of a musical work.

A more performance-sensitive approach, on the other hand, should acknowledge that a performance is "a source of signification in its own right. It does not simply 'express', 'project', or 'bring out' original meaning….Performance is a source of musical meaning"[41] itself, and this meaning is the outcome of the creative contribution of performers as artists rather than performers as mere executors of the notes. And the process by which they create their art is not one of translating, through physical means, expressive meaning that they have already discovered in the structure of music and conceptualised (or pre-calculated) into sound in the abstract, but is, instead, a process where the whole body engages in an act of constructing meaning in real time of performance. What determines interpretation is not only whatever conceptual or analytical work was done before performance but the whole creative process that takes place during performance and which involves the whole body reacting to the structure of the notes while shaping expression at will. In other words, performance expression is not something that can exist outside the context of the creative involvement of the performing body during performance.

1.2 Thinking through the body

This brings us to a deeper cause of the gap between theory and practice: the fact that theorists and performers have come to engage with music in fundamentally different (but only apparently opposing[42]) ways and to have very different goals. The first tend to use almost exclusively the intellect to arrive at meaningful conceptualisations of the structure of music, while the second use the whole body in order to perform meaningfully the notes of a piece. The first negotiate out of real time abstract relations between musical concepts to arrive at static musical descriptions, while the second shape or "relate" the notes dynamically in real time through physical movement. They both make musical judgments in their attempt to see behind the notes they have in front of them but each of them gives emphasis on different faculties: the first tend to think more logically and

[40] Stein, *Form and Performance,* p. 20. Cited in Howell, "Analysis and performance", p. 695.
[41] Cook, "Analysing performance," p. 247.
[42] As I argue in this thesis, it is possible to integrate these apparently opposing ways of engaging with music.

conceptually while the second tend to think more intuitively through their whole bodies. A video (see Media Example 1.1)[43] with excerpts from a piano master class given by Maria João Pires will provide a rather extreme but insightful example of the way many performers teach, reflecting at the same time the significance they give to bodily intuition during the performing process. A dialogue between Pires and a student documented on this video is transcribed below:

> S: [Plays theme of Ludwig van Beethoven's 32 Variations for piano in C minor]
> P: Why did you play it staccato? You like it?
> S: Yeah, in my version it's written staccato. I think I have a bad version, probably, but…
> P: No, there is no good or bad version, they are all bad, because they don't represent even one percent of what is the music. Not one percent, nothing! I mean it's just an idea of what we could do, so it's something like [demonstrates without playing]: ba-ba-ba-ba…pa-pa-pa-pa, but ta-ta-ta-ta, it's a little bit…I don't know, something bothers me, I am not convinced. You see, what means, this is something that has a violence…[she plays "with violence"]…it's violence! Now, you come…[she plays inexpressively] it doesn't convince me. This is fear [she plays with expression or "with fear"].

What Pires is trying to convey to the student is that it's not enough to decide intellectually how the muscles should play the notes: to play convincingly, one has to look behind the literal meaning of notes as you read them in the score and discover musical meaning in one's own bodily relation to the music: the way one allows this meaning to emerge or come out is, in Pires's words, by "feeling" the music with one's whole body (as opposed to just the mind), by "getting nervous":

> S: [Plays Variation 1]
> 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-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. Go, go, go
> S: [Plays]
> P: Why is it staccato? Who says? You? You feel inside that is staccato?
> S: Yes
> P: Really? Promise me?

[43] These excerpts are part of a video clip available at "http://www.youtube.com/watch?v=Wt44_q73SGs" (last access: 14 Sept 2011). All Media Examples can be accessed online at Royal Holloway's website: http://pure.rhul.ac.uk/portal/en/publications/hearing-through-the-body-expression-and-movement-in-music%284ee236cc-0de8-4e2a-b6e5-191eb6722c20%29.html (last access: 3 May 2012).

S: My feeling of…no, my brain says me, yeah. My sense of style says me I have to play everything staccato
P: What is style?
S: [Plays]
P: Also not good
S: No, but…
P: How is a bad mixture between everything, no style. Let's just have an atmosphere.
S: [Plays Variation 5]
P: Yes, good, good….Go, go, go….Yes, go, don't be…never make rubato. Just…get nervous, try to get nervous yourself. Feel it, your heart beating has to go up, up. Don't let your brain work.

It's interesting that Pires's teaching approach is not one where specific musical or expressive details are pointed out in order to explain what's objectively "wrong" or unmusical and help the student improve performance. On the contrary, she believes that if one tries to think through various performance interventions the result is poor. That's why she tells the student never to *make* rubato, or consciously bend the tempo here and there in order to make the music more expressive. If the student himself cannot "feel" the music, nothing can make a difference. In other words, the student has to find expressive meaning from inside out, through her own active engagement with the expressive qualities of the music. These expressive qualities can be sensed through his emotional world, which is interrelated with his physical sensation and sense of movement in musical space-time:

S: [Plays variation 5]
P: No, don't look down. Start like this, because the body is very important. Start like this [she holds his head straight up] and go up, ok?... Don't look down, and do this now in a very organic way, like this [shows how to move the head and body up as the phrase unfolds]. Yes! Ok….It's still a bit stiff, it's not just, comes from here, you know….it goes up

S: [Plays Variation 28]
P: Move…[moving her hands]….imagine a bird that is flying, and like this you know [moves hands and body from side to side] and just flying without really flying, just going with the wind, ok?
S: [Plays]
P: It's ok, it was much better now. Yes it is, believe me….Now I show you something. When you want, no no sit down here, when you want to be rid of this terrible pressure that we have, that is the bar, and being in tempo, and be there, you have to do like that, is that ok, it has to be there, it has to be there again, and you are afraid that is not there. No, just [demonstrates]…like time when you practice, instead of…

The sensation of movement (or *kinesthesis*[44]) is very crucial in performing music meaningfully. These sensations, which are linked to both one's psychological and physical world, are what make possible the sense of musical movement, conveyed during performance. If one, therefore, directs the muscles of the body directly through the mind, the result can be unmusical. The example that Pires gives in relation to this, is the "terrible pressure" that the notated bar (a conceptual constraint) puts on performers, something that encourages the body to move in regular and predictable cycles of movements, which, in turn, translates in analogous regular accentual patterns that give the music an undesirable metric effect. This well-known problem in instrument playing can be partly blamed on certain kinds of abstract conceptualisations such as the one here, which wants the music fitted into pre-assigned containers of strong and weak beats.[45] Even certain everyday life experiences, which involve regular motions (i.e. our heartbeat in the state of rest or various regular motions observed in nature), could encourage a similarly mechanical music playing. Art music, however, goes beyond simple everyday life experiences and calls for more complex and free movements, which, for Pires, can be accessed by allowing our imagination to move freely in space-time, as if, to repeat Pires, "flying without really flying" or "going with the wind". The art of phrasing is one of the most crucial elements in expressive performance and one which cannot very easily be taught. A colleague of Pires talks about this with her during the break of the piano master class:

> J: We think the phrase is at the very heart of music making. And we study the phrase here, we try to make it clear, obvious as if in poetry, you don't run the lines and you stop at each end of the line but you know that the phrase goes beyond the words. The phrase goes beyond the lines. In music as well, I was telling Maria João right now how difficult it is to tell the students that we don't have to follow the measures to find the phrase, on the contrary we have to abstract from the measure, from the bars, otherwise they play…falling the measures, and they play like ta-ta-ta-, and we have to be free from those, that's the basic thing.

The difficulty with teaching good phrasing, but also expressive playing in general, is partly due to the obvious lack of an effective language to communicate musical expression. Even though metaphors of movement and other verbal or physical representations of emotional states (such as those used by Pires) can be useful at times in

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[44] For a discussion of some early psychological research on the idea of *kinesthesis* as relating to musical research see Doğantan, *Mathis Lussy*, p.141ff.

[45] A number of theorists have criticised such abstract conceptualizations of metric structure. See for example Hasty's *Meter as Rhythm*.

conveying musical meaning, they are not enough. This is because expressive musical movement is more complex and dynamic than verbal descriptions. Moreover, such verbal descriptions cannot provide an effective link between the notes in the score and the physical movements required in performance in order to produce the sound effect desired. A physical-gestural kind of language (or what Joseph Kerman described as the "arcane sign-gesture-and-grunt system by which professionals communicate about interpretation at rehearsals"[46]), although perhaps communicating expressive movement more directly, nevertheless lacks the specificity necessary for clear communication.[47]

1.3 Rational thinking

This lack of rigour in analytical thinking and the subjective, unsystematic vocabulary used by many performers has been highly criticised by theorists and "has provoked a reaction against the seemingly naïve interpreter in this age of 'rational reflection'…: as a result we tend –unjustly—not to consider performers as serious thinkers about music."[48] What have particularly been questioned are the "intuitive bases for interpretive choices, as opposed to articulate justifications derived from serious analysis".[49] For Wallace Berry, "a good performance is a portrayal, a critical discourse on the conceived meaning of a work, and a fruit of inquiry and evaluative reflection"; conversely, "musical experience is richest when functional elements of shape, continuity, vitality, and direction have been sharply discerned in analysis, and construed as a basis for the intellectual awareness which must underlie truly illuminating interpretation".[50] Eugene Narmour expresses a similar idea even more dogmatically when he says that "in order to fulfil their artistic responsibilities both to the composer and to the listener, performers, as co-creators,… *must* acquire theoretical and analytical competence so as not only to know

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[46] Kerman, *Contemplating Music*, p. 196.
[47] In a recent empirical study by Karlsson and Juslin, where the content of several instrumental music lessons was analysed, the conclusion was clear: "When expression was addressed explicitly, it was usually in terms of quite vague statements that provided little concrete advice about the playing to the student…The results suggest that the teaching of expression was not guided by any explicit or systematic knowledge about expression and its underlying principles that was conveyed to the student. Instead, teachers seemed to convey a general, intuitive way of thinking of expression, which served mainly to help students to discover the 'secrets' of expression on their own." See Karlsson and Juslin, "Musical expression: An observational study of instrumental teaching", p. 321.
[48] Rink, review of Berry's *Musical Structure and Performance*, p. 323.
[49] Berry, *Musical Structure and Performance*, p. 7
[50] Ibid., p. 6.

how to interpret, but what difference one interpretation versus another makes"[51] (emphasis mine).

While rational analytical inquiry is always welcome, it does not come without negative consequences. This is true especially if it becomes a highly prescriptive tool, dictating specific interpretations that are claimed to be superior to others.[52] Even if the analysis comes from performers themselves, such pre-calculated performances can seriously impinge on the creative act of performance, which takes place in time and depends not only on various external factors but also on the inspiration of the moment. The problem is that such analyses, which often involve one-to-one mappings of structure and performance, generally point to performance interventions that involve emphasis of isolated melodic lines, patterns or notes, failing to integrate them into a more unified interpretive profile. This can give, during performance, the effect of trying to impose an interpretation from outside, lacking a more naturally flowing and deeply personal interpretation. As Rink notes, commenting on Schmalfeldt's and Berry's advice on articulating hidden motives,[53] "the rationale for motivic projection seems more intellectually than musically determined: the effect in performance would almost inevitably be clumsy".[54]

Too much rational thinking during performance can be distracting to performers and inhibiting to their spontaneity, which is very crucial in freely expressing themselves. This is not to say that performers don't need to think during performance, or that they leave it all to chance, or to their "capricious intuition" (in Berry's words), but that they need to think in a different way, and they do it right on the spot. According to Meyer, "analysis is something which happens whenever one attends intelligently to the world…The performance of a piece is, therefore, the actualization of an analytic act—even though such analysis may have been intuitive and unsystematic. For what a performer *does* is to make the relationships and patterns potential in the composer's score clear to the mind and ear of the experienced listener….analysis is implicit in what the performer does".[55] While Meyer is correct to note that performance is the actualisation of an analytical act, this act should not be equated with that of traditional conceptual analysis, which precedes the act of performance. As Rink points out, "the

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[51] Narmour, "On the relationship of analytical theory to performance and interpretation", p. 340.

[52] Narmour, for example, in his article "On the relationship of analytical theory to performance and interpretation", comes up with the conclusion, through analytical inquiry alone, that specific interpretations are superior to others.

[53] Schmalfeldt, "On the relation of analysis to performance"; Berry, *Musical Structure and Performance,* pp. 31-2.

[54] Rink, review of Berry's *Musical Structure and Performance*, p. 321.

[55] Meyer, *Explaining Music*, p. 29

vast terminological gulf between analysts and performers blinds us to the fact that good performers are continuously engaged in a process of 'analysis', only…of a kind different from that employed in published analyses. The former sort of 'analysis' is not some independent procedure applied to the act of interpretation; on the contrary, it forms an integral part of the performing process."[56] While, in other words, performers can also conduct conceptual kind of analysis as *preparation* for performance, an even more essential kind of "analysis" takes place *during* performance itself, as a kind of integrated body-mind thinking.

When Pires was giving advice to the student on how to play the music meaningfully, she was in a way providing the student with an "analytical tool" that she considers valuable to performers. This is a tool which emphasises more the use of bodily sensation than rational thinking, and one which is used *during* the performing process. That the body is very important not only for expressing but also for generating musical knowledge has been verified empirically by various studies. Davidson and 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".[57] 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 patterns) and bodily gestures, suggesting that an important part of the shaping force of musical expression is bodily sensation and movement.[58]

This means that not only the *way* performers think is different but also *what* they attend to: in Rink's words, "whereas analysts concentrate on musical structure, performers attend primarily to musical 'shape', which is analogous to structure but tends to be more dynamic through its sensitivity to momentum, climax, and ebb and flow, comprising an outline, a general plan, a set of gestures unfolding in time."[59] If music theory, therefore, can be of any value to performers, it should emphasise exactly these more dynamic qualities of music that are more relevant to what they do. Moreover, since

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[56] Rink, review of Berry's *Musical Structure and Performance*, p. 323.
[57] Davidson and Correia, "Body movement", p. 237.
[58] See, for example, Todd, "A model" and "The dynamics"; Kronman and Sundberg, "Is the musical retard"; Friberg and Sundberg, "Does music performance"; Repp, "A constraint" and "Diversity". For other relevant studies on the importance of the body in relation to music and performance see Clarke and Davidson, "The body in performance"; Lidov, "Mind and body"; Doğantan, "The body behind music"; and Juntunen and Hyvönen, "Embodiment in musical knowing".
[59] Rink, review of Berry's *Musical Structure and Performance*, p. 323. Pires's masterclass discussed above is one characteristic example of how a performer thinks about musical performance and the importance of bodily gesture and shape: for a recent empirical study of how performers think about this see Daniel Leech-Wilkinson's CMPCP research project in progress: http://www.cmpcp.ac.uk/smip.html.

performers rely heavily on their skill to make musical judgments on the spot while they perform (or what Rink calls "informed intuition"[60]), their training should also aim at cultivating this exact skill. In other words, what's most useful to performers is not some analytical product, which can be used after the analytical act in whatever way, but the skill to think analytically during performance, so that learned, conceptual understanding of structure automatically feeds into instinctive, bodily sensation and movement, and vice versa.

1.4 Eurhythmicising Music Theory

In order to cultivate such a skill, very important is the *process* of analysis. 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,[61] not any analytical process is equally valuable to performers (or to listeners, if the goal is to develop listening skills that lead to a deeper and fuller understanding and enjoyment of music). An analytical process that is too rational or abstract, Pires would argue (and I would agree), would help cultivate skills that are not the most useful to performers. What has always been neglected in theory pedagogy for performers is the involvement of the body, in addition to the mind, in analytical processes. One of the few and earliest music pedagogues that have given the body a central role in the learning process is Émile Jacques-Dalcroze, who believed that experiencing music through the whole body led 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 perform music more musically and expressively.[62] While Eurhythmics is not particularly designed to teach expressive performance and cannot by any means substitute for other more specific methods for this purpose, the creative use of the whole body in relation to the music is especially relevant to performers: it is such a more holistic and bodily-centred kind of musicality that performers need; one that integrates harmoniously both intellectual and kinaesthetic skills. Even though methods that make use of the body in teaching music may appear

[60] Ibid., pp.323-24.
[61] Cook, "Analysing performance"; Howell, "Analysis and performance".
[62] Dalcroze, *Rhythm, Music and Education* and *Eurhythmics.* It is not uncommon for methods of music education to incorporate elements of bodily movement, such as, for example, the Kodály, Orff or Suzuki methods. Nevertheless, few give as much emphasis on the importance of bodily movement as Dalcroze Eurhythmics.

more relevant to performers, they can be equally effective for cultivating general musicianship and good listening skills. As I argue in this thesis, bodily movement is essential not only during performance but also during music listening. The body is an important means of sensing and comprehending music and therefore needs to be equally responsive and sensitive during listening.

But has Eurhythmics been able to provide this missing link between theory and practice or between mind and body? Even though Eurhythmics is quite widespread today, with numerous classes being given regularly around the world, it remains largely an independent, if not isolated, field that has yet to prove its proper place in the music curriculum. While it enjoys some relative popularity within classes of younger students, its acceptance by high-school or college-level curricula is much more limited. As Virginia Mead observes, “teachers in the middle school and high school are more reluctant to incorporate movement in their lessons because they themselves don't feel comfortable moving, because the space is limited, or because they are not sure of the reason or value of doing so.”[63] Moreover, the majority of eurhythmics exercises address more basic music theoretical concepts so that one cannot immediately see the relation between bodily movement and more advanced theoretical concepts and complex expressive nuances.[64]

Despite these limitations of Eurhythmics, bodily movement remains central to the understanding of the expressive character of music, and if music theory concentrates more on the relation between bodily movement and musical structure/movement, it will more successfully manage to win performers’ respect as well as show that music theory can be of direct value to what performers do.[65] One way to achieve this would be to show more clearly how abstract theoretical concepts relate to the bodily aspect of our experience, whether we are actively engaged in the performing process or more passively as listeners. While more abstract and highly specialised music theoretical languages are often necessary in order for theorists to address certain kinds of theoretical issues, other more intuitive and bodily-based ones are equally necessary for various teaching

[63] Mead, “More than mere movement”, p. 40.
[64] Pierce’s *Deepening Musical Performance through Movement* is a recent example attempting to address more complex and advanced theoretical concepts (such as Schenkerian theory) through bodily movement.
[65] In “Let’s play the music (and dance)”, Keller tells the story of the choreographer Mark Morris, who, in trying to make a group of young musicians in a summer music festival play more meaningfully and expressively, asked them to dance the music. The result was revealing to them. His observation is that, in the conservatories, music students are taught to value more things like intonation than (what he considers as more important) rhythmic/expressive movement. According to Morris, “This experience makes musicians better, way better! The thing is, I'm the enemy of the conservatory, because it kills music. Nobody gives a damn about intonation. It's not about that. Imagination has been wrung out of these people, and it's tragic. Really, musicians have lousy rhythm.” Cited in Pierce, *Deepening Musical Performance through Movement*, p. 1.

purposes. The specific analytical language one uses is crucial not only in communicating musical meaning but also in the kind of analytical process involved. If you have to complete, for instance, a Roman-numeral analysis, you get to think about and experience the music being analysed in a very different way than if you are asked to describe it in terms of, say, a series of emotional states. In the first case, you need to process in your head how abstract musical objects, such as keys, chords, scales and intervals, relate to each other, and thus experience music more intellectually; in the second, in order to determine whether the music induces emotions of sadness, happiness, fear, or other more complex emotional states, you will need to focus more in your psychophysiological aspect of musical experience, observing (and thus further stimulating) feelings, physiological sensations and other emotion-related experiences. It is possible, in other words, through the right kind of analytical concepts, to direct the attention of analysts towards specific aspects of experience and encourage them, thus, to engage with music in specific ways, for specific pedagogical reasons or purposes. This observation is the reverse of what Lakoff and Johnson describe in their theory of conceptual structure, according to which bodily processes (or movement; that is, our everyday bodily interaction with the world around us) influence and constrain cognitive information processing so that the resulting knowledge is structured in a largely metaphorical way.[66] Similarly, but in reverse order, one would expect that when an analytical method that makes more use of embodied metaphors as analytical concepts is used, more bodily involvement during the analytical process will be trigerred. The interdependence of bodily and cognitive processes with embodied metaphors is schematically represented in Figure 1.1.

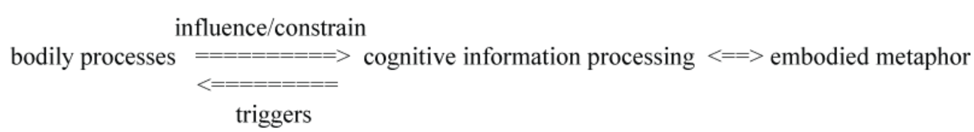

Figure 1.1 Interdependence of bodily and cognitive processes with embodied metaphors.

[66] See Lakoff and Johnson, *Metaphors We Live By*; Johnson, *The Body in the Mind;* and Lakoff and Johnson, *Philosophy in the Flesh.* Other theorists who have explored the way our everyday bodily experiences are metaphorically mapped onto music include Saslaw, “Forces, containers, and paths”; Larson, “Musical forces and melodic patterns”, “Musical forces and melodic expectations” and “Musical gesture and musical forces”; Zbikowski, “Conceptual models and cross-domain mapping”; Mead, “Bodily hearing”; Cox, “The mimetic hypothesis and embodied musical meaning”; Brower, “A cognitive theory of musical meaning”.

Many theorists have used a number of analogies between musical processes and everyday experience of movement, either of our own bodily movement or some moving object. Rothstein's "Like falling off a log: Rubato in Chopin's Prelude in A-flat Major" (2005) is a striking example of an attempt to explain his own experience of shaping tempo rubato and dynamics in performance through movement metaphors. The idea is to come up with a more conscious approach to rubato, one that could help improve further performers' mostly intuitive art of rubato. As a way of justifying what he thinks as appropriate performance interventions (tempo and dynamic shadings) he invokes metaphors that provide a link between musical structure and everyday experience of movement:

> For most of my life I have both felt and visualized meter through the image of a bouncing ball. For me, motion to a downbeat is quite literally *downward* motion, and a downbeat is something you bounce off of. To put the matter another way: Where a rhythm is heard as anacrustic, moving *from* upbeat *to* downbeat, the downbeat exerts a kind of gravitational force, attracting notes of the upbeat to it. Since human beings experience gravity as a downward pull, Chopin's *Ur*-rhythm is readily felt as a downward fall or slide to the bottom of something. Downward slides are not constant in speed; they accelerate. And since any physical medium contains some friction, the rate of acceleration will not be constant, either; it will increase until the effect of friction is largely overcome. Hence the image in my title. Rubato in this prelude is as easy, and as natural, as falling off a log.[67]

In contrast to other more quantitative and empirical approaches to rubato,[68] he introduces a qualitative, introspective one, where the analysts are implicitly encouraged to look into (in addition to the structure of the music) their own bodily relation to the music during performance: his reference to the gravitational force and his description of the downbeat as "quite *literally* downward motion" (emphasis mine) is not meant, in other words as just a metaphor but as an invitation to the reader to experience themselves what he does.[69] Like Schmalfeldt's approach,[70] the analyst becomes both a performer

[67] Rothstein, "Like falling off a log: Rubato in Chopin's Prelude in A-flat major".
[68] See for example, Palmer "Timing in skilled music performance"; Todd, "A computational model of rubato"; Epstein, *Shaping Time*, (part four, "Flexible Tempo"); Repp, "Diversity and commonality in music performance" and "A microcosm of musical expression. I"; Widmer and Goebl, "Computational models of expressive music performance"; Cook, "Performance analysis and Chopin's Mazurkas". What's interesting is that quantitative, empirical research on rubato does not generally have any immediate pedagogical aim.
[69] Apart from this explicit mapping of structure onto bodily movement, in the remaining of his article, Rothstein, unfortunately, does not develop this idea further as one might reasonably expect from his title. He rather uses a less explicit, metaphorical language to justify what seems to be a very central idea in his whole article. A more explicit mapping of structure to bodily experience is what I attempt to do here myself.
[70] See Schmalfeldt, "On the relation of analysis to performance".

and theorist in order to explain music performance matters. Despite some occasional reference to the potential value of his approach to performers, however, Rothstein's work remains largely theoretically driven, guided more by the desire to come up with generalised principles of rubato than anything else. It represents a theorist's attempt to regulate performance matters. As in Schmalfeldt's seemingly performer-sensitive approach, "the analyst", in Rink's words, "speaks far more authoritatively than the performer, who seems subservient to her counterpart's theoretical edicts".[71]

Alexandra Pierce's approach, on the other hand, is closer to the Dalcroze tradition in giving more emphasis on training the body to react to subtle expressive details of music.[72] In *Deepening Musical Performance through Movement*, Pierce goes a step beyond Dalcroze to explore more systematically 9 specific musical elements that she picks out as important for helping musicians, and particularly performers, gain a richer understanding of music: cadential tonic, melody, beat and measure, coalescence, spanning of phrase, phrase climax, reverberation and juncture, character, and tone voice. These specific theoretical topics are explored as full body movement challenges, making thus the link between musical structure and bodily movement stronger. At the same time, the involvement of the body brings access to expressive details that traditional theory is rarely capable of. Even the simple and seemingly childish exercise of balloon tapping, for example, helps one become aware of the difference between living meter, imbued with affect and bodily energy, and the regular clicks of a metronomic conception of meter: "the delicate tap of the balloon's elastic skin through the fingertips is a tactile testimony that words like *attack* or *accent* or *strong note* or even *downbeat* are not quite suitable descriptions of ping."[73] In addition to bodily sensation, very important is also the visual aspect the various movement exercises involved. As she explains in relation to the balloon exercises, "the track of the balloon upward in the air makes *visible* the subsidence of momentum after the rebound from the ping"[74] (emphasis mine). The eye pedagogy in Pierce's approach is further strengthened by the use of contouring exercises, either by tracing musical elements through hand movement or by drawing squiggles with the pencil (see Figure 1.2).

[71] Rink, "Analyzing rhythmic shape", p. 126.
[72] See Pierce, *Deepening Musical Performance through Movement*. For approaches similar to Pierce's see Urista, *Embodying Music Theory* and "Beyond words", and Graybill, "Towards a pedagogy of gestural rhythm". For a discussion of these and other "somaesthetic" approaches see Maus, "Somaesthetics of music".
[73] For Pierce, "ping" is exactly this more visceral experience of metric accent. See Pierce, *Deepening Musical Performance*, p. 71.
[74] Ibid., note 10, p. 198.

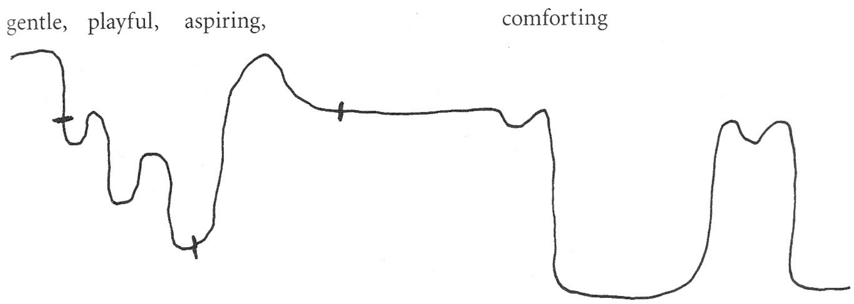

Figure 1.2. Reproduction of *Figure 3.7* from Pierce's *Deepening Musical Performance* (p. 61) showing a graphic representation of a contouring exercise on Debussy's "Bruyères", bars. 1-4.

The use of various kinds of graphing symbols and shapes is quite common in musical analysis. What differs in each case is the kind of symbols used, what they represent and their ability to convey effectively important structural aspects of music. For Pierce, "squiggles are suggestive but make most sense if translated back into arm movement". This highlights both the importance of embodying musical meaning but also the fact that in the case of such free drawing squiggles a lot of specific expressive structural aspects are left out. (And this is probably why the need of additional prose descriptions, such as the ones shown in Figure 1.2, are necessary.) There is a huge gap, in other words, between what is bodily experienced when moving to music and what can be conveyed in these squiggles and in graphic representations in general. And even though these squiggles are only a supplemental pedagogical tool within the overall approach, the absence of any systematic graphing language to communicate with some detail what is bodily experienced might be considered an important weakness of her overall approach. This is not to say that the problem is the absence of a written down analytical product per se—after all it's the analytical process that matters the most—, but the presence of one is a sign of a more systematic and structured analytical process. In addition to moving to the music with free moving physical gestures, the use of a conceptual gestural language consisting of a limited number of movement patterns could help one focus on the essential character of expressive movement. Moreover, graphing what is bodily experienced using such a more systematic gestural language is a valuable pedagogical process, one which can raise what is intuitively and physically experienced to a more conscious, conceptual level. It can also make it possible for one to communicate with others what is experienced and give one the chance to visualise gestural process as a whole so that further critique and re-evaluation can take place.

Capturing on paper something as subtle as expressive musical meaning is a real challenge and one can focus only on certain specific aspects of this experience. Conceptualising expressive meaning as movement process has preoccupied a number of theorists, some of whom used various empirical methods to capture movement down on paper. Some early examples include three German pioneers (Sievers, Becking and Truslit), who attempted to come up, through empirical methods, with a taxonomy of simple geometrical shapes to describe expressive movement.[75] Among later examples, Todd's work stands out for its attempt to synthesise the various contributions of all components of expression (tempo, dynamics, articulation, timbre), as well as of properties of the score, into an "integrated energy flux" graph.[76] Similarly synthesing work is Clyne's use of the "sentograph" (a computer apparatus recording finger pressure over time in the form of pressure curves) to measure people's emotional reaction to music, classified in terms of "essentic forms" patterns.[77]

While empirical work on performance expression has become quite common during the last couple of decades,[78] few have attempted to come up with some integrated visualisation of musical expression. The tendency is to focus on each expression parameter separately, the same way in theorising compositional structure (as we will see in the next chapter) theorists tend to look at each structural component in relative isolation. The two most common expression parameters isolated are tempo and dynamics/loudness, extracted from recordings and visualised in the form of fluctuation graphs. While it is not uncommon to draw comparisons between tempo and dynamic fluctuation graphs, combining the two into a single visualisation, so that expression is considered in its totality, has rarely been attempted. Such an example is the "Performance Worm"—developed by a group of researchers under Gerhard Widmer's supervision at the Austrian Research Institute for Artificial Intelligence—a visualisation program that displays tempo-loudness trajectories in synchrony with the music.[79] A

[75] For a discussion of these early examples see Patrick Shove and Bruno H. Repp, "Musical motion and performance: Theoretical and empirical perspectives".
[76] Todd, "The auditory 'primal sketch': A multiscale model of rhythmic grouping". See Clarke, "Expression in performance" for a discussion of Todd's approach.
[77] Clynes, "Expressive microstructure in music". For a discussion of Clynes's work see Clarke, "Expression in performance", pp. 72-75.
[78] For a comprehensive discussion of empirical work on expressive music performance up to the year 2002 see Gabrielsson "Music performance"; For a more up-to-date additional discussion see Cook's "Methods for analysing recordings".
[79] See Dixon et al., "The Performance Worm" and "Real time tracking and visualisation of musical expression"; and Widmer et al., "In search of the Horowitz factor".

snapshot of the animation is shown in Figure 1.3, where the loudness and tempo of Daniel Barenboim's performance of the first 4 bars of Mozart's K.332, extracted semi-automatically by the computer, move on the vertical and horizontal axes respectively. Combining tempo and dynamics into a single visualisation makes sense since performers shape expression during performance, particularly at the microstructural level, in a single unified manner.[80] Nevertheless, one wonders to what extent such a visualisation can capture actual perceived performance expression, given that objective change in both these parameters is not necessarily the same as the expressive *effect* of their change. To what extent do the gestural "qualities" that emerge from this animation, as classified by the Performance Worm researches as a set of prototypical tempo–dynamic patterns (see Figure 1.4), represent actual human gestural qualities relating to perceived musical expression? (The patterns shown in Figure 1.4 were produced by cutting the complete performance trajectories of various performances of Mozart Piano Sonatas into short segments after which they were subjected into clustering analysis, resulting into this "alphabet" of their performance.)

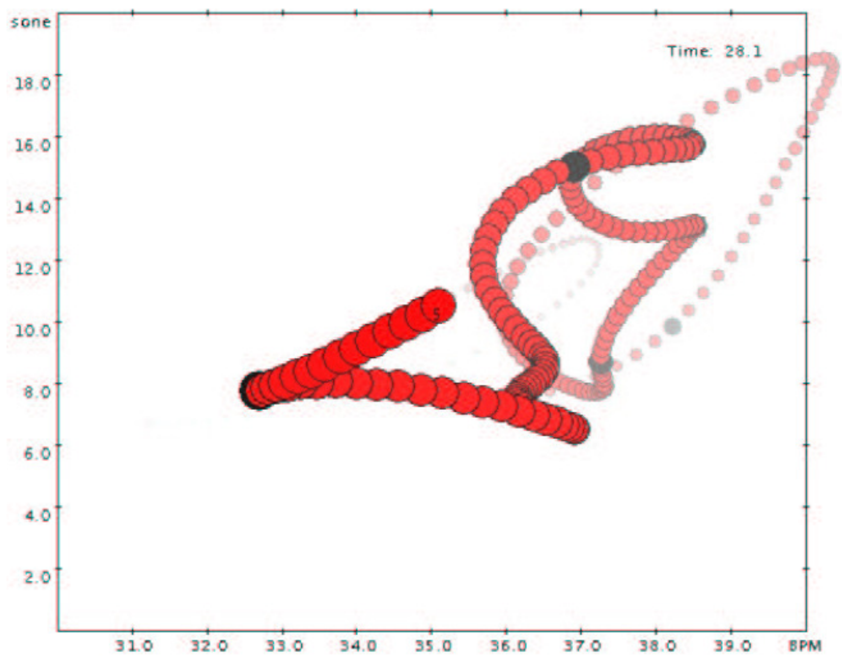

Figure 1.3 Snapshot of Widmer's 'Performance Worm' visualisation of the first four bars of Daniel Barenboim's performance of Mozart's F major sonata K.332, second movement.

[80] Even though it is not infrequent for performers to think of dynamics or tempo separately as they perform, the majority of tempo and dynamic variation, responsible for subtle expressive nuance, is processed in a unified manner, as undifferentiated expressive gesture, process or motion.

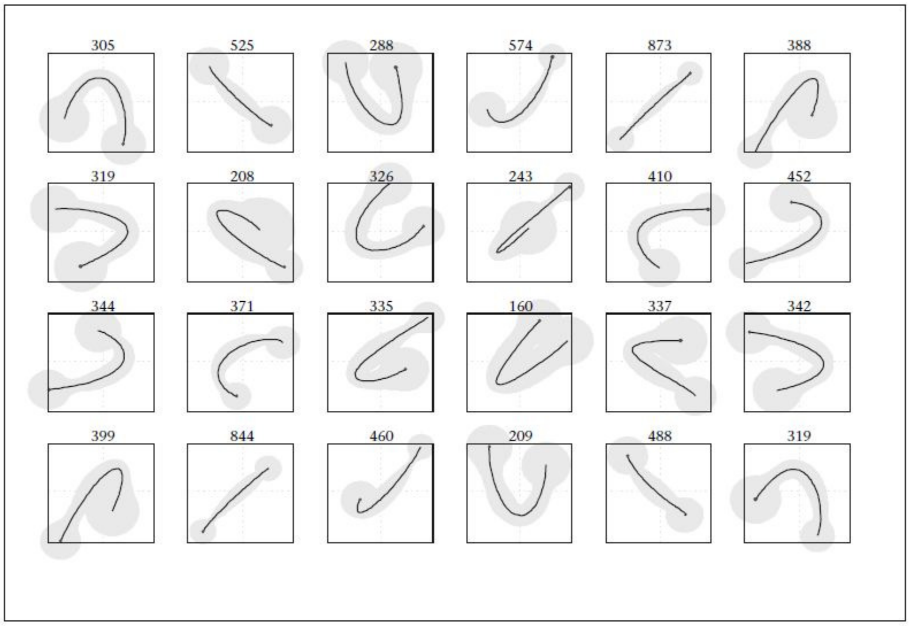

Figure 1.4 Reproduction of Figure 7 from Widmer and et al, “In search of the Horowitz factor” (2003): A Mozart Performance “Alphabet” (cluster prototypes) computed by Segmentation, Mean, and Variance Normalisation and Clustering from performances of Mozart Piano Sonatas by six pianists. (Directionality is shown by dots at the end of each pattern.)

While one may reasonably criticise the Performance Worm visualisation along with the resulting clustering prototypes for having a relatively low intuitive feel, one has to also consider that Widmer’s project is a study in artificial intelligence rather than musicology, and as such, it has different goals in mind.[81] What is of primary interest to the creators of the Performance Worm is not whatever intuitive insights it might have to offer in music education; their goal is rather “to go beyond informal observations and derive objective, quantitative conclusions from the data.”[82] Coming from a more traditional theoretical background, John Rink’s use of “intensity curves”,[83] on the other hand, has more explicit pedagogical goals. The intensity curve shown in Figure 1.5, is “a graphic representation of the music’s ebb and flow, its ‘contour’ in time, determined by all active elements (harmony, melody, rhythm, dynamics, etc.) working either in sync, or out of phase with one another to create the changing degrees of energy and thus the

[81] See Cook, “Methods for analysing recordings”, p. 231.
[82] Widmer et al, “In search of the Horowitz factor” p. 120.
[83] The idea of the “intensity curve” comes from Wallace Berry’s *Structural Functions in Music* (see especially page 274 for a characteristic example of his use of this concept). Unlike Rink, who uses it as a means of representing musical performance, Berry used it as an analytical devise of compositional structure, but, as Rink notes, “given its attention to such features as timing, generation and relaxations of momentum, relative high and low points, etc., its descriptive powers in respect of performance are profound, likewise its potential as a *prescriptive* tool in performance pedagogy”. See Rink, “Translating musical meaning”, p. 235, note 68.

overall shape."[84] It is not produced by any empirical means, but rather through an informal analysis of the score and an approximate intuitive observation and measurement of experienced "intensity" levels. Despite the fact that such graphs can neither accurately define nor objectively quantify intensity levels,[85] the process of constructing them is nevertheless a powerful analytical exercise, allowing performers to act "out the music's drama,…tracing a *grande ligne* to mediate between the poetic and the structural."[86] Its advantage lies in the way the idea of the intensity curve provides a unifying thread (*grande ligne*) of all structural components of the piece and its performance into a "rhythmically activated synthesis."[87] It is meant to capture those elements of the experience of music that derive from our embodied experience of music, such as phases of tension and release, temporally defined musical gestures and goal directed impulses, inner pulsations and agitated or relaxed states, etc. While, however, the whole analytical process may encourage one to engage with a lot of these musical qualities, the obvious limitations of the graphing system becomes an obstacle in communicating effectively all those qualities. To be sure, no static graphic representation can ever capture accurately something as complex and subtle as musical expression. However, a number of essential qualities of this experience are left out, most importantly those that give musical experience its characteristic rhythmic quality: if expression is to be understood in terms of dynamic gestural qualities, then rhythmic process, which involves directed motion into goal moments (perceived as accents, strong beats or, at higher levels as, important structural arrivals) has to be represented more accurately. Even the "Performance Worm" representation, which is more dynamic in nature, lacks this very important rhythmic quality, in contrast to the "Bouncing Ball" representation that I will propose, for example, which does convey these rhythmic/metric qualities of music.

[84] Rink, "Translating musical meaning", p. 234.
[85] Ibid., p. 235.
[86] Ibid., p. 237.
[87] Ibid., p. 218.

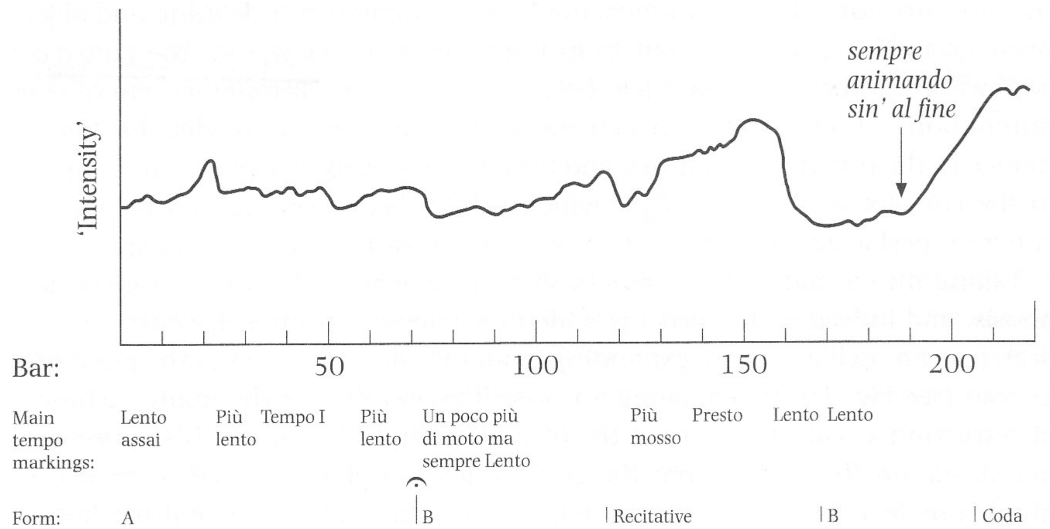

Figure 1.5 John Rink's Figure 10.2 showing an "intensity curve" of "Valée d'Obermann" based on the author's performance.

I consider the analytical language one uses of utmost importance because it is this that not only helps an effective communication of musical experience but also *guides* this experience. It is, therefore, here that I have invested the most in this research project. Having observed various other analytical systems, my aim was to come up with a graphing system that minimises as much as possible the various limitations of other analytical systems while combining as many strong points as possible. The "Bouncing Ball" can be thought of both as a more rhythmic/metric rendition of the Performance Worm animation and more comprehensive in scope, while the "arrow" graphic representation as a similarly more rhythmic rendition of the "intensity curve". In either case, I give particular importance to the hierarchy of moments of impact (accents), or tension release, as well as to the specific character of gestural processes that prepare and leave these moments. And to return to my goal stated at the forefront—that is, to eurhythmicise music theory—, by focusing on the articulation of clear gestural patterns that closely model physical gestural patterns, I hope to provide a method of analysis that encourages experiencing music through the whole body. And I consider this valuable and relevant not only to performers, who engage with music in a more obviously physical manner, but to anyone who wishes to experience music more deeply.

For musicians in general, deeper experience of music does not simply mean physically moving more to the music, but also making the connection between movement and the structure of music. The solution I propose is conceptualising structure as movement, by means of an integrated framework of structural contribution. The idea of the conceptualisation of an integrated musical structure with emphasis on gestural movement will become more clear in the following chapter, where I go at length into the extent to which traditional music theory has succeeded in engaging those more dynamic qualities of music and in making the connection between structural function and movement possible. This exploration will also allow me to show how the solution that I will propose in chapters 3-6 is in many ways a combination or integration of ideas from traditional theoretical and analytical approaches.

CHAPTER 2

Towards an Integrated/Rhythmicised Music Theory

As I argued in the previous chapter, the main cause of the problem of the gap between theory and practice may lie in the very different ways theorists and non-theorists engage with music, the first, more intellectually, and the second, more bodily. Seen from the non-theorist's point of view, music theory fails to touch some of the aspects of music that are most relevant and meaningful to them. What is hard for them is to relate different theoretical descriptions to their experience of music, which happens in a more immediate, instinctive and visceral way. Why exactly this is the case will be the subject of this chapter: focusing mainly on some of the most representative theories and analytical methods currently taught in American universities, where music theory is an independent field of study, I will try to discover what specific aspects of music theorising lie more on the abstract, intellectual side and which describe music in a more dynamic and bodily-relevant way. Are there specific ways of making music theory more performer- or listener-friendly, and in what ways could one combine certain elements of traditional theory while avoiding others?

In answering these questions, very important will be the consideration of what the object of music theorising and analysis is, who does the analysis, why and for what purpose. Issues relating to the pedagogical value of specific analytical methods inevitably arise, including how they guide one to engage with music and how they change the way one experiences or hears music. When I am analysing the score, am I only interested in finding various abstract relationships between the note structures or am I ultimately interested in relating such observations to the way I experience, hear or perform music? In what ways do issues relating to performance expression inevitably arise and how should one best incorporate them within various theoretical and analytical systems?

Among my main arguments will be that the kinds of graphic systems used in music analysis put a number of constraints both on the concepts and theoretical framework of the methods and ultimately on how the analysts get to think about and hear music. When in the first part of this chapter, therefore, I focus on Schenkerian analysis, my aim is not to provide a comprehensive history or critique of a century-long

Schenkerian practice but to demonstrate how its graphic system has shaped through its various limitations the way we today conceptualise harmonic and voice-leading structures. The reductive (and thus inherently discontinuous) nature of its graphic system and its reliance on abstract note representations are among the main reasons Schenkerian analysis, like most other traditional analytical methods, cannot effectively convey the more dynamic, motional aspects of musical meaning. The conceptualisation of rhythmic structure in terms of static groups of musical objects presents similar obstacles in grasping the motional character of music. Ultimately, these problems are traced down to the general tendency of theorising various aspects of musical structure independently, by using different concepts and analytical symbols that cannot easily integrate with and inform each other. As a result, musical analysis focuses on only isolated structural components at a time, failing to communicate effectively musical meaning as experienced in its totality.

Directly relating to all this is the extent to which the analytical process or product can engage one with or is relevant to performance expression issues. Given that performance expression is at the forefront of musical experience, providing a music theory that can engage such issues is essential. Traditional theory has been a bit slow at systematically addressing performance expression issues and integrating them into already existing methods of analysis. While in recent years academia has seen the development of the new field of performance studies, this has largely run independent of traditional music theory and analysis with the result that it hasn't yet provided solutions to the already existing methods of analysis. My aim in this chapter will therefore be to show the importance of integrating not only different aspects of structure (harmony/voice-leading with rhythm and meter for example) but also performance expression: analysing performance parameters largely in isolation, in other words, is of limited value. If the value of music analysis lies in how it helps one enrich musical hearing and understanding, it is hard to imagine how performance expression cannot have a prominent role in the analytical process. What is often ignored, however, is that every time an analyst attempts to hear the analytical result or make analytical judgments relating to the compositional structure, performance expression is inevitably involved. Harmonic function, for example, is closely interrelated and influenced by performance expression and failing to integrate matters of expression into theories of harmony will result in incomplete and pedagogically weak theoretical systems and analytical methods.

2.1 The reductionist approach

In music theory and analysis, a common way of theorising structural meaning takes as a starting point the notes of the musical score and assigns them structural function. In theorising pitch structure, one of the most widespread concepts used to describe structural function is the idea of *structural importance*, which, since the popularisation of Schenkerian theory and analysis, has become a standard way of conceptualising musical structure: certain musical notes are said to be more structurally important than others, based on their structural properties and relations. This has been a revolutionary idea since it allowed the conceptualisation of the complexity of musical structure in terms of simpler versions of it, which could be played and compared with the original music. What was lost in these structural descriptions, however, is how exactly one can hear structural importance itself, something rarely explained; instead, the emphasis is on the conceptual understanding of structural meaning through various criteria (or rules) of structural importance. In the idea of passing motion, for example, the passing note or chord is said to be less structurally important than the note or chord which it moves from or towards. The criteria used here include harmonic, melodic/contrapuntal and metric factors. In Fuxian counterpoint, a consonant interval occurring on the strong beat has more structural weight than the dissonant passing note occurring on the weak beat, connecting two consonant intervals melodically by step. That the passing note is considered less structurally important is implied by the idea that it is, according to Fux, merely "filling out the space between two notes that are a third distant from each other".[88] Thus, in representing structural function notes that are less structurally important are reduced out, creating stripped out versions of the original piece in successive hierarchical levels.

This process of melodic construction, named *diminution*, has been widely theorised since Fux and has become the foundation of Schenkerian theory.[89] In addition to the passing note, other diminutions are possible, the main ones being the neighbouring note, the consonant skip and the arpeggiation. Surface-level details are said to embellish or elaborate more structural notes that lie at higher levels of structure. Conversely, higher-level structures are reductions of more foreground-level structures. These reduced-out higher-level structures do not only show which notes are more structural but

[88] Fux, *The Study of Counterpoint*, p.41.
[89] See Forte and Gilbert, *Introduction to Schenkerian Analysis,* chapter one, pp.7-40.

also show how "coherence lies behind the notes",[90] revealing deeper structural connections among the notes of the surface. While such kind of structural descriptions do capture important aspects of musical structure, their highly abstract nature, which heavily depends on note structures taken rather directly from the music itself, prevents one from relating them to important qualities of listening experience relating to expressive movement. While we do hear musical sounds as discrete pitch entities, their meaning as experienced in real time cannot be exhausted by such note-centred structures. This will be explored in more detail below in relation to the analysis of a song by Schumann with the aim of finding out in what ways the Schenkerian graphing method, along with its basic theoretical system, can communicate and engage the analyst in important motional qualities of music.

My choice of Schenkerian analysis for this purpose can be explained by the fact that not only has it influenced harmonic and voice-leading thinking more than any other theory but it is generally considered as a method that can convey linearity and movement in music. Schenker himself made explicit reference to how his graphing system relates to musical motion. This is especially true in Schenker's early writings, where he took more interest in verbally representing the character of music, by drawing parallels between life and musical forces.[91] When explained through words, the idea of motion is at its most explicit and clearest form, such as when he talks about the fundamental line signifying "motion, striving towards a goal, and ultimately the completion of this course";[92] or when he observes that in music, as in real life, "motion toward the goal encounters obstacles, reverses, disappointments, and involves great distances, detours, expansions, interpolations, and, in short, retardations of all kinds".[93] What interests me, however, here is not so much Schenker's initial intentions or what he or later theorists thought of or explained his system in terms of motion. What interests me the most is the analytical possibilities and constraints presented to the analyst by the basic concepts and symbols of Schenkerian analysis as standardised in *Free Composition* and widely taught today particularly in American universities.

Figure 2.2 reproduces Schenker's voice-leading graph of Schumann's "Aus meinen Tränen spriessen" from *Dichterliebe* (the score is shown in Figure 2.1). Given my interest in the pedagogical value of music analysis, my aim here is to see how the analysts get to be engaged with music as a result of this process of analysis and how they

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[90] Schenker, *Free Composition*, p.6.
[91] See Snarrenberg, *Schenker's Interpretive Practice,* p. 138, and Cook, *The Schenker Project.*
[92] Ibid., p.4.
[93] Ibid., p.5.

are able to relate these concepts and graphic symbols to the more intuitive or bodily kind of experience of music, as well as to aspects of performance expression.[94] In each of the three structural levels included in Schenker's analysis, one can see an obvious attempt to highlight certain "deeper-level" connections, which in the top voice take the form of stepwise descending melodic lines. As one moves from the foreground to the background, structurally less "important" notes are reduced out (i.e. omitted) in order to arrive at simplified versions of the piece, containing structurally "significant" information. In bar 1, for example, the only note left in the foreground level graph is C♯, taken directly from the vocal line and the top voice of the right hand accompaniment, both of which repeat this note four times in a specific rhythmic pattern. While I can conceptually understand the logic behind reducing bar 1 into a single note C♯, in trying to hear the meaning conveyed by this graphic representation (i.e. relate the graph to a hearing of the piece) I find myself fixed on this static C♯, shutting my ears and body to important rhythmic processes. I experience the same phenomenon in relation to the lower line of the foreground graph in bars 1-2, where the music of the left hand piano accompaniment is reduced to the arpeggiated motion A-D. Given my interest in movement, I will try to see to what extent and in what way this graphic representation can be understood in more dynamic terms:[95] despite the fact that notes G, F and E have been reduced out as mere passing notes, I know that the slur that connects the remaining A with D (even though the slur doesn't quite connect the two notes directly but continues to reach over the bass E of bar 3) conveys some kind of motion from the first note to the downbeat of bar 2. The neutrality, however, of the slurring representation cannot specify exactly how this movement takes place. (As we will see below, goal-directed motion can be of different kinds.) It therefore discourages me from exploring further the motional qualities of this passage, the rhythmic or gestural character of harmonic motion.

[94] My choice of this specific piece for discussing issues relating to Schenkerian analysis is explained by the fact that this piece has aroused considerable interest among theorists since it was first discussed in Allen Forte's important introductory essay on Schenker's theories, "Schenker's conception of musical structure". Among the theorists who have commented on different issues and problems relating to this analysis include Kerman, "How we got into analysis and how to get out", Komar, "The music of Dichterliebe", Agawu, "Schenkerian notation in theory and practice", Dubiel, "When you are a Beethoven", and Drabkin, , "Schenker, the consonant passing note".

[95] Obviously, a student or anyone who doesn't have a research interest in dynamic aspects of music, as I do, can easily miss out important dynamic qualities of tonal motion.

Figure 2.1 Schumann's "Aus meinen Tränen spriessen" from *Dichterliebe.*

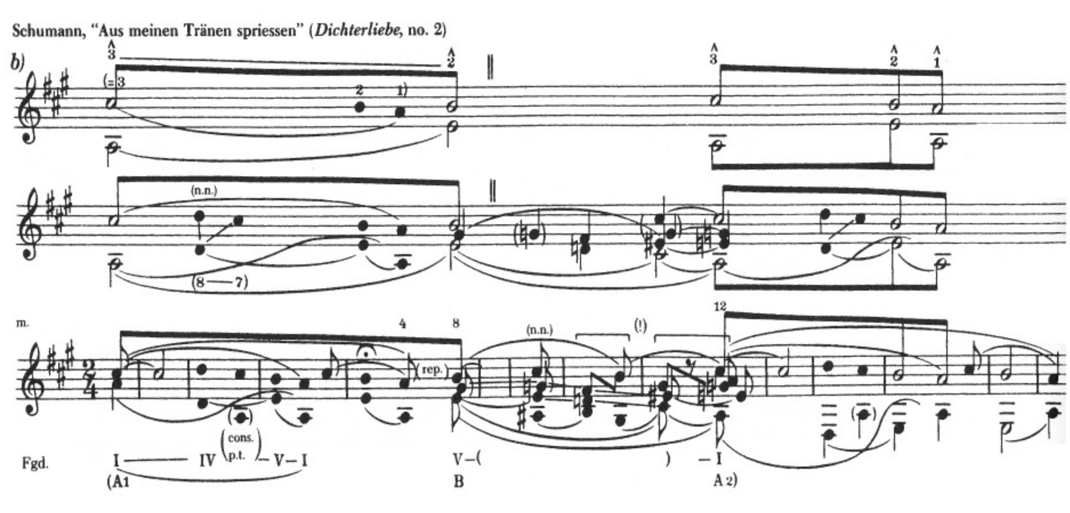

Figure 2.2 Reproduction of Schenker's Example 22b from *Free Composition*.

If in the case of the prolongations we saw above some kind of movement could somehow be deduced, what about deeper-level prolongations found in the top two graphs? In the top structural level graph of Figure 2.2, I can see the first three bars of the music represented by a single tonic triad, an upper voice C♯ supported by a bass A. This is a typical kind of prolongation in Schenkerian analysis and a typical way of conceptualising harmonic structure in general today. What justifies the representation of the first three bars by a prolongation of the tonic chord is the complete harmonic progression from tonic through subdominant, dominant and back to tonic in bars 1-3. This is clearly shown in the lowest of the three graphs through a slur connecting the C♯-D-C♯-B-A linear line supported by the corresponding harmonies shown by the Roman Numerals below. At this level of structure, however, I have even more difficulty relating such a conceptual kind of analysis to my more bodily experience of the piece. At a conceptual level, this kind of analysis is not hard to understand, but at a more experiential level it is much harder. The idea of a whole section of music (even if in this case only three bars) being represented by a single note or chord suggests a very static understanding of music: the idea of a chord being prolonged for a certain duration of time, or of a section *being* in a key, encourages me to understand the music in the same way I perceive certain unchanging properties of static objects in real space. As I hear the music in time, I try to see how I can help myself hear these three bars as being somehow dominated by this tonic chord of C♯. In my attempt to retain this structurally more important C♯ in my mind throughout hearing these three bars of music, I find myself unable to focus at the same time on other more dynamic aspects of music. It appears to me that the idea of a linear connection or of a prolongational reduction are concepts more suitable for helping one conceptualise, than bodily experiencing, how tonal motion works.

Perhaps if I try to hear the middle graph together with the top one, the stasis of the relatively long prolongation of the opening C♯ will be overcome. A look at the middle graph of Figure 2.2 shows that the IV chord on the downbeat of bar 2 is given a prominent role as a neighbouring chord connected with the dominant chord of bar 4. In my attempt to hear this connection two bars apart, I have the same problem I observed above: it's hard for me to hear this connection without "shutting" my ears through bars 2 and 3. What's particularly troublesome is to hear this IV chord as more structural than what immediately follows. My musical sense tells me that this IV chord, being part of a descending melodic gesture ending the first two-bar phrase, gives way by resolving into the following tonic chord. Recognising that there are many different ways one can hear music, I try to hear Schenker's structural observation: the result is a conflict between hearing the music in its metric-rhythmic-gestural context and a more conceptual tracing of Schenker's note/chord relations. Perhaps Schenker picks this D major chord because of its metric and dynamic accentuation and the higher melodic note D. But wouldn't that reduce structural importance to surface salience? What about the fact that the tonic chord of bar 2 is harmonically more stable at the end of a short phrase? In determining structural importance shouldn't one consider and try to find a compromise or synthesis of all structural factors involved? Does Schenkerian analysis give more emphasis on certain structural aspects at the expense of others? To what extent is this the result of the nature of the graphic representation? What are the consequences in relation to the kind of information communicated through such graphs and the way it guides the analyst to hear music? If harmonic stability and the rhythmic/metric context is largely ignored—structural aspects directly related to the idea of tension and release— how can one relate such analyses to the more bodily understanding of music?[96]

Lerdahl and Jackendoff, in explaining their Generative Theory of Tonal Music (GTTM), comment on a similar example (their Example 5.4 reproduced here in Figure 2.3), which they consider particularly revealing with regard to the above issue. Having introduced the concept of reduction, which, as they note, works as in Schenkerian analysis, they stress that:

> in assessing one's intuitions about reductions, it is important not to confuse structural importance with surface salience. These often coincide, but not always. For example, the IV chord at the beginning of measure 1 in 5.4 is prominent because of the relative height of the soprano and bass notes and because of its metrical position. But from a reductional viewpoint it is perhaps best considered as an 'appoggiatura chord,' just as are the events on the following strong beat 3 of measure 1 and beat 1 of measure 2. Likewise (to take a more extreme case), perhaps the most striking moment in the first movement of Beethoven's Eroica Symphony is the dissonant climax in measure 276-279 (example 5.5) [reproduced here in Figure 2.4]. But in terms of structural importance, this event resolves into (i.e., is less stable than, and hence structurally less important than) the dominant of E minor in measure 280-283, which in turn is subordinate to the E minor chord at the beginning of measure 284.[97]

[96] For further discussion on internal inconsistency, musical/notational ambiguity and analytical (as well as perceptual) abstraction in relation to Schenker's analysis of this piece see Larson, "A strict use of analytical notation".

[97] Lerdahl and Jackendoff, *Generative Theory of Tonal Music*, pp. 108-109.

Figure 2.3 Reproduction of Lerdahl and Jackendoff's Example 5.4 from *A Generative Theory of Tonal Music.*

Figure 2.4 Reproduction of Lerdahl and Jackendoff's Example 5.5 from *A Generative Theory of Tonal Music*.

What's good about this interpretation is that I can actually relate it much better than Schenker's to my bodily experience of music. The same interpretation can be applied to the opening of the Schumann song, where the misalignment of surface salience and structural importance shapes a clearly articulated dynamic gesture: the dynamic accent and metrical accentuation on the IV chord in bar 2 of the Schumann song work together to shape a clearly articulated "appoggiatura chord", making the resolution on the stable tonic that follows even more effective and clear. The character of this gesture, which can be described as "metacrustic", is the opposite of our more familiar anacrustic one: up to the downbeat of bar two the character of the music was anacrustic, brought to a temporary closure at the end of the bar through a balancing metacrustic gesture. Such gestures, which can more easily be grasped in terms of our bodily relation to music, are highly relevant and meaningful to music listeners and especially to performers, who engage with music in an overtly physical manner. And as we will see below, it's actually possible to a large extent to integrate such more dynamic structural considerations into our harmonic-voice-leading reading.

Another important thing about understanding tonal motion in terms of gestures is the fact that these gestures can be understood and felt in different degrees of strength. It's not a matter of picking the IV or I chord as more structural, relegating the other one to a less "important", lower structural level, but one of considering the dynamic relation between these two chords. The fact that a closure is felt (and read) after the tonic chord in bar 2 does not prevent one from also hearing or feeling a relatively continuous line into the following phrase that begins at the end of bar 2. A performer can make sure to shape only a subtle closural effect in bar 2 so that the bigger line of the four-bar phrase can also be projected. This bigger line is probably what Schenker attempted to capture through his voice-leading graph, but in doing so, he sacrificed important aspects of the gestural/rhythmic dynamic of tonal motion. The graphic representation of gestural motion that I will propose in the following chapters will attempt to capture this aspect of tonal motion which can be shaped by an endless variety of dynamic gestures of different shapes and degrees of strength.

Related to the above observation is one limitation of the Schenkerian reductive analytical system which does not allow the analyst to easily show how all structural factors play a role in structural meaning. This is not to say that one should expect from an analytical method to show all possible structural relations, but that it's important that a balance between different structural factors should be taken into account. We already saw how in the Schumann example the criterion of harmonic stability was overruled by other surface salience factors. Often, in making a Schenkerian reduction, there is a dilemma as to which of two musical events to consider more structural. (That was the case with bar 2 of the Schuman example we saw above: should one prolong the IV or the I chord?) And you have to choose *either* the one *or* the other, even if at times it feels that, experientially, both choices might be of equal importance. Perhaps, in other words, the real meaning of this dilemma lies in the ambiguity of the situation, one where *neither* the one *nor* the other is more structural but that *both* the one *and* the other should be acknowledged as being in effect at the same time. But how can one conceptualise or graphically represent the experiential effect of such a situation?[98] Isn't the experiential *effect* of ambiguity an important structural observation that should not only be acknowledged in musical analysis but also captured graphically as well? A solution sometimes proposed is that of posing alternatives readings, each illuminating different aspects of the structure of the music. Alternative readings, however, cannot effectively represent ambiguous situations since they represent *different* ways of hearing a piece that are often contradicting with each other: you either hear it this way or that way. And the point is that it is often the theories and analytical representations themselves that provide these limitations, stemming out of their inability to consider how various structural factors interact and integrate with each other.

Carl Schachter, a dedicated Schenkerian, in his article "Either/or", recognises this "particularly frequent and sometimes troublesome problem in harmonic analysis: is the governing chord of a given stretch of music IV or I?"[99] Commenting on his Example 4.2 (reproduced here in Figure 2.5), where such a dilemma or "forked path" occurs, he points out that "on the basis of harmony and voice-leading, we could hardly decide"—as he puts it, "one is as good or as bad as the other"[100]—and that other contextual factors need to be considered. In order to demonstrate how decisive motivic structure is, he considers a couple of musical examples, one of which is reproduced here in Figure 2.6. Of the three possible interpretations provided below the music in Figure 2.6, the first (showing a prolongation of the tonic throughout bars 2-6) is considered "the only tenable interpretation…because of the motivic implications of the upper line and for that reason

[98] In the example of Figure 2.3, for example, Lerdahl and Jackendoff's dilemma of whether to prolong the IV or the I chord at the beginning of the excerpt reflects an ambiguity effect where the listener, upon hearing the first few chords, is not sure whether the music is in D or G major, or in more dynamic terms, whether the chord D or G is more stable.
[99] Schachter, *Either/or*, p. 123.
[100] Ibid., p. 123.

alone":[101] Given the importance of the opening neighbour-note figure, which carries out the 'Mesto' character of the Mazurka, hearing the motivic connections suggested at (b) would miss, as Schachter explains, a motivic parallelism that is very important in maintaining the integrity of the neighbour-note figure and of the meaning of the structure of piece in general.

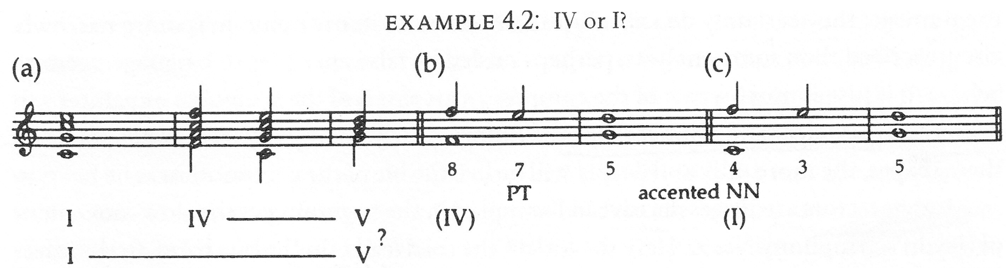

Figure 2.5 Reproduction of Schachter's Example 4.2 from "Either/or".

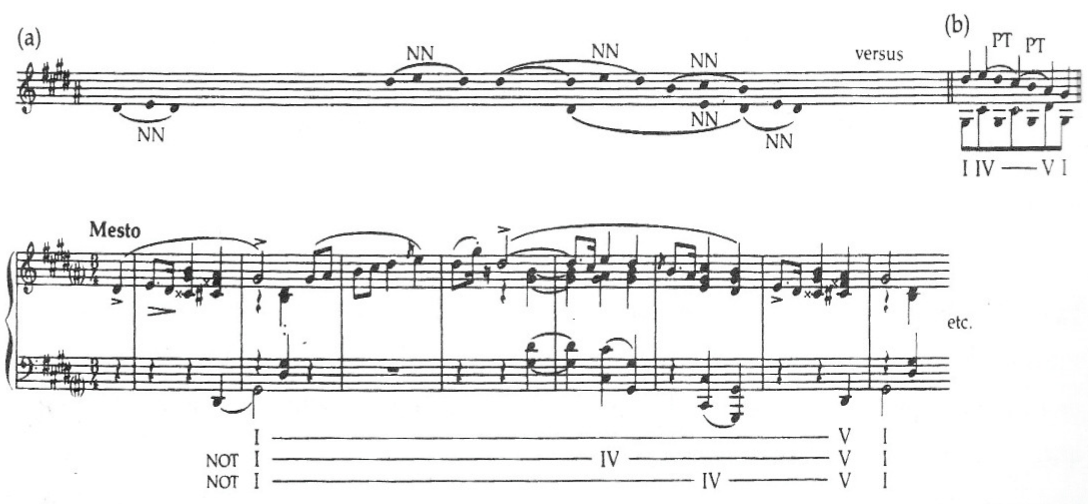

Figure 2.6 Reproduction of Schachter's Example 4.3 from "Either/or": voice-leading analysis of Chopin's Mazurka Op.33, No1.

The above analytical discussion by Schachter is a representative example of how, in post-war American Schenkerian practice, the importance of motivic parallelism (both diachronic and synchronic) is emphasised at the expense of other structural factors. Motivic relations, rather than being a mere "passive by-product of the analytic process", serve as "a guide to the process of constructing graphs",[102] with the result that both the

[101] Ibid., p. 124.
[102] Cohn, "The autonomy of motives", p. 156.

analytical process and the analytical product are dominated by motivic considerations. By "freeing motives from the surface" and by giving them a more flexible and abstract definition, Schenkerians have been able to make "profoundly subtle and compelling observations about motivic unity in the context of the analysis of particular pieces".[103] This, in turn, allowed them to produce interesting analyses, something that seems to have become a goal in itself, since, as Cohn pointed out, that would help (as it actually did) the popularisation of Schenkerian theory in the English-speaking world. The cost of all this, to return to my main argument, is that, while Schenkerian theory succeeded in becoming popular and influential in the theory community, music theory itself alienated many musicians and particularly non-theorists, who were promised that this method could enrich their listening experience and enhance their performing ability. What specifically alienated them is precisely this preoccupation with abstract theoretical concepts such as the understanding of melodic movement in terms of motives deprived of their more dynamic content.

Thus, in the graph of the Schumann song of Figure 2.2, Schenker brings out motivic connections that conflict, rather than effectively integrate, with important phrasing, rhythmic and harmonic considerations. Raising the IV chord to a relatively high structural status seems to be done in order to allow the descending-fourth motive (D-A) to come to the surface. Such motives, however, seem to be quite empty of any rhythmic or dynamic content, instead limiting themselves to moving horizontally in an abstract, arrhythmic "tone-space."[104] The arrhythmic character of Schenker's linear connections can be seen both in the visual aspect of the graphing symbols and the lack of systematic rhythmic criteria used for determining structural importance. As a result, from a pedagogical point of view, which is my main concern here, the analyst is not sufficiently and directly encouraged to engage with important dynamic qualities of music, which relate to every aspect of musical structure, including motivic structure.

Among the many theorists who acknowledged this general lack of serious treatment of rhythm in Schenker's method is Carl Schachter, who made particular efforts to clarify the rhythmic aspect of the structure of music as it relates to Schenkerian theory.[105] Of particular interest is Schachter's recasting of Schenkerian notation into his

[103] Ibid., p. 154.
[104] For Schenker's understanding of the fundamental structure see *Free Composition*, Chapter 2, and particularly paragraphs 13, "The horizontal fulfilment of the fundamental line as tone-space" and 21, "The fundamental structure is arrhythmic".
[105] Schachter's three articles on "Rhythm and linear analysis" are representative of his understanding of rhythmic issues in tonal music. Among the many other theorists who dealt with problems relating to rhythm in tonal music include Cooper and Meyer, Roy Travis, Wallace Berry, Arthur Komar, William Rothstein, Peter Westergaard, Edward Cone and Victor Zuckerkandl.

"durational reductions" in such a way that connections between durational and tonal organization are revealed. A characteristic example of how Schachter's durational reduction graphs "shed light on the contrapuntal meaning—and also, therefore, on the harmonic status"[106] of chords is shown in Figure 2.8, which reproduces Schachter's Example 2.4 from his article "Rhythm and linear analysis: Durational reduction". Durational reductions are based on the idea of reducing the original notated note values, while grouping bars into larger metrical units (hypermeasures). In the case of Chopin's Prelude in G major (Figure 2.7), each four-four bar of the notated music is reduced in the graph to one crotchet. One interesting detail about the harmonic status of the "apparent" II6/5 chord interpolated in bars 22-23 between the IV and V is revealed by observing how it behaves within four-bar hypermeasures:

> In a true II6/5, the sixth above the bass ($\hat{2}$) is a consonant tone; it represents the root of the chord. The foreign, dissonant element is the fifth; usually, it is a suspension resolving into the third of V. As the graph indicates, however, the a^1 in the Prelude is not a chord tone; it anticipates the fifth of dominant harmony. The chord, therefore, is not really a II; it is a IV with an anticipation added. Only awareness of the larger metrical pattern enables us to perceive that a^1 as an anticipation and to hear the chord succession correctly.[107]

[106] Schachter, "Rhythm and linear analysis: Durational reduction", p. 60.
[107]Ibid., p. 60.

Figure 2.7 Chopin's Prelude Op. 28, No. 3, bars 15-33.

EXAMPLE 2.4: Chopin, Prelude, Op. 28, No. 3, durational reductions

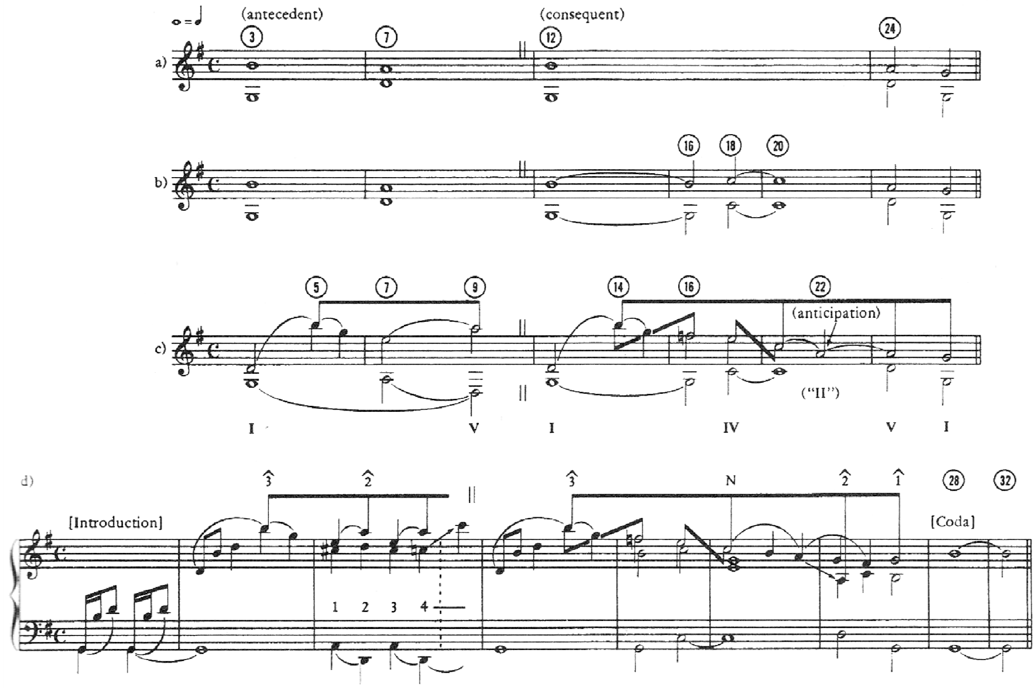

Figure 2.8 Reproduction of Schachter's Example 2.4: durational reduction of Chopin's Prelude, Op. 28, No. 3.

In Figure 2.9 I have attempted to capture the interaction between tonal and durational processes in Schumann's song "Aus meinen Tränen" in a different way. My goal here is to integrate voice-leading connections with rhythmic processes in such a way that motives are understood as dynamic gestural patterns. In the top graph (a), unlike Schenker's slurs which indicate a rhythmically neutral connection path between notes, the forward- and backward-pointing arrows indicate the direction of these gestures towards and away from goal moments respectively. These goal moments do not represent what we commonly understand as more structurally important, but moments that are rhythmically or gesturally emphasised. By contrast, stemmed notes indicate harmonically more structural or stable moments. (To distinguish these graphs from Schenker's voice-leading graph, as well as highlight their emphasis on the dynamic, bodily experienced content, I call them **"voice-feeling" graphs**.) The lower graph (b) provides a kind of rhythmic/metric/voice-leading reduction that further illuminates structural meaning and particularly how rhythmic context influences harmonic/voice-leading meaning (see Figured Bass symbols below).

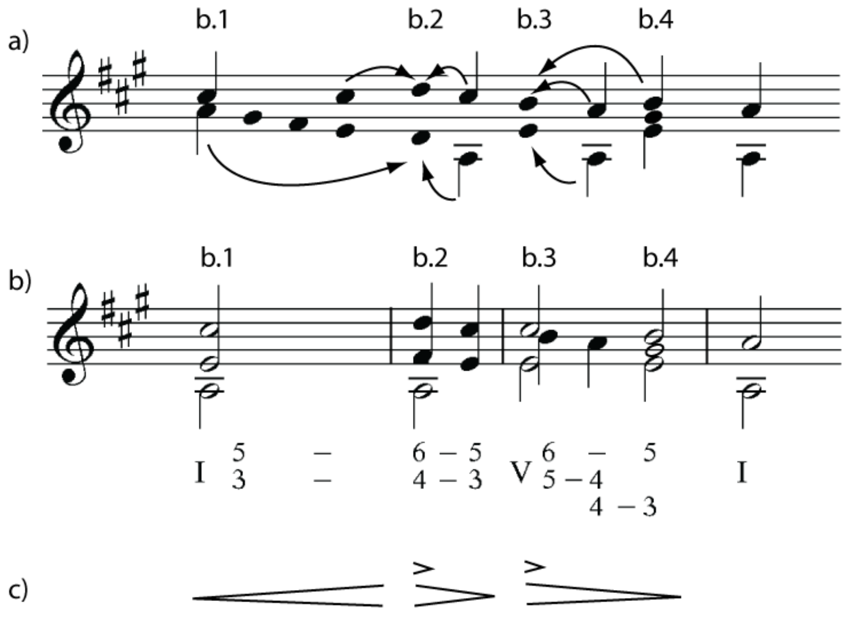

Figure 2.9 a)"Voice-feeling" graph of Schumann's "Aus meinen Tränen", b) rhythmic/metric/voice-leading reduction and c) articulation and dynamic interventions corresponding with analytical reading.

As discussed above, the first gesture shown in the graph (a forward pointing arrow) moves anacrustically from the beginning of the song towards the downbeat of bar 2. This gesture (an **Anacrusis**) is given flesh both by the descending stepwise bass motion shown in the graph and by the overall anacrustic (short-to-long) rhythmic profile of the phrase. It is also shaped by the way I imagine the music performed as suggested by the dynamic markings of Figure 2.9c. At the downbeat of bar two, a balancing gesture of the opposite direction (a **Metacrusis**) begins, which allows the tension initiated with the occurrence of the IV chord to be released on the tonic chord at the second half of the bar. What's particularly noteworthy here is the way the dynamic relation between these two chords has shaped an underlying voice-leading as shown in the lower graph: the dissonant character of the IV chord of bar 2 resolving into the tonic has an effect comparable to that of a $^{6}_{4}$ suspended motion over a tonic chord. This interpretation agrees with Schachter's second reading of the chord progression shown above in Figure 2.5c, with regard to which he notes that "the f² is a neighbour-note shifted to the downbeat, where it takes the guise of a 4-3 suspension".[108] What matters here is the effect of the suspended motion shown, which is comparable to the effect of the actual music. In a

[108] Schachter, "Either/or", p. 123.

similar way, the function of bars 3-4 is explained as two nested suspending motions over a dominant bass chord, showing dynamic experience at the half- and full-bar level of structure: the first, a 5-4 suspension over a V^6_4 chord, describes the character of the accented dominant chord on the downbeat of bar 3 resolving into the following tonic chord; the second, a $^6_4$ - $^5_3$ motion, describes the character of the whole second melodic phrase (bars 3-4; "viel blühende Blumen hervor"), which, similarly, involves the dynamic relation between the relatively unstable music of bar 3 resolving into a more stable dominant chord on the fermata in bar 4. (The rebarring of the music in the lower graph intends to show how the metric feel of the music has been modified as a result of this performance.) In addition to harmonic and rhythmic stability relations between the chords, we can also see what voice-leading and motivic forces emerge (see the bracketed music in the top graph): after the A-D descending stepwise motion in bar 1, another similar motion (D-G♯) begins from the top register, proceeding more slowly in two-note groups. Unifying these two descending fifth motions is an overarching third descent that starts right at the beginning with the melodic C♯, rests for a moment a step below on B at the half cadence in bar 4, to eventually resolve down to A one beat later with an authentic cadence. While these graphs manage to capture the dynamic interaction between durational and tonal processes more effectively than traditional voice-leading graphs, they nevertheless retain a lot of the limitations of Schenker's reductive graphic system as discussed above. Their implications relating to performance interpretation will be discussed below.

2.2 Analysis through/as performance

An important factor in measuring the value of any analytical method is undoubtedly its ability to enrich one's hearing and understanding of music in positive ways. While methods that give emphasis to more abstract kinds of structural observations of compositional structure have their own value, it is those that focus more on dynamic qualities of music that provide a more direct and effective means of exploring the meaning of music as experienced sound. They achieve this not only by resulting in analyses that communicate important information about the expressive content of the music but also by engaging the analysts in processes that require active listening or imagining of the sound of music. If an analytical language involves observing aspects of rhythm, meter, tension and release or harmonic stability as well as details of performance expression, there is more chance that the analyst will actually experience them as sound rather than just process everything conceptually. Such was the case with my analysis shown in Figure 2.9 above. In deciding whether to prolong the IV rather than the I in bar 2, for example, I had to experience how the various musical parameters add up to dynamic gestural processes: I had to observe how the anacrustic character of the music of the first bar (shaped by metric, rhythmic, melodic, harmonic and other factors) leads into the downbeat of bar 3, a relatively tense and unstable moment, resolved in the second half of the bar. Particularly crucial in such kind of analysis is performance expression, either imagined or actually performed, which depends upon articulation, dynamic and tempo fluctuation interventions. My specific interpretation shown at 2.9b matches closely with a specific performance (in this case imagined), whose dynamics are approximated at 2.9c. As I will show in the following sections, differences in performance interpretation can result in a different experienced gestural content, which can be translated into a different voice-leading and harmonic interpretation. Focusing, therefore, on gestural motion, which is sensitive to subtle expressive nuances, in addition to and in relation to other structural aspects, provides a good tool for studying the meaning of performance interpretation too.

Analytical methods such as Schenker's, by contrast, which describe aspects of structure in less dynamic terms, are not particularly effective in engaging the analysts with issues relating to performance expression.[109] While it is possible to hear the structural relations captured by Schenkerian graphs within specific performance interpretation contexts, it is neither clear as to how this mapping can be done, nor necessary in order to understand their meaning. As a result, the analytical process required takes a largely abstract nature. Among the theorists who attempted to address issues of performance in relation to musical structure and particularly voice-leading was Schenker himself.[110] Perhaps partly due to his awareness of this limitation of his analytical method and/or his great interest in performance issues, he planned to write a

[109] Explicit doubts about the value of Schenkerian analysis for performers were expressed by other theorists such as John Rink: "although Schenkerian analysis can elegantly depict a tonal structure in its hierarchical complexity, to make the performance deliberately conform to and try to recreate the analysis in sound would be dubious, however valuable a knowledge of the processes and relationships implicit in that analysis might be in building the interpretation". See Rink, "Analyzing rhythmic shape", p. 127.

[110] Some early attempts by Schenker to address issues of performance can be seen in various articles in *Tonwille*, *The Masterwork of Music* and in *J.S. Bach's Chromatic Fantasy and Fugue*. A discussion of Schenker's understanding of structure in relation to performance can be found in Rothstein, "Heinrich Schenker as an interpreter of Beethoven's piano sonatas", Burkhart, "Heinrich Schenker's theory of levels and musical performance" and Cook, *The Schenker Project*. Other Schenkerians who applied Schenkerian analysis more freely to performance include Pierce, "Developing Schenkerian hearing and performing" and Dodson, "Performance grouping and alternative Schenkerian readings".

treatise on musical performance clarifying the implications that structural function as shown in his voice-leading graphs have on performance. He talks very specifically about this intention in *The Masterwork in Music*, Vol. I, where in introducing the content of this forthcoming treatise, he talks about how "it will be systematically shown for the first time that dynamics, like voice-leading and diminution, are organized according to structural levels, genealogically, as it were. For each level of voice-leading, whether background or foreground, and for each level of diminution, there is a corresponding dynamic level of the first order, second order and so forth".[111] Even *Free Composition* itself, a book which was otherwise intended for "instructing composers in need of assistance to attain the means of extending the content", may "most decisively…serve the art of performance".[112]

What's interesting is that Schenker never finished this book, although a compilation of his notes on the subject have been recently edited by Heribert Esser and published as *The Art of Performance*. Schenker may have actually even abandoned the idea altogether,[113] perhaps because such a mapping of voice-leading graphs and dynamics was not quite possible, given the fact that his voice-leading graphs are oriented towards more abstract structural relations devoid of dynamic content.[114] Even to the extent that it is possible, however, the way this linking of structure with performance has been suggested by Schenker himself and followed by several structuralist theorists in post-war America, suggests an analytical process that does not allow a two-way flow of information and feedback from compositional structure to performance. From a pedagogical point of view but also from a performer's perspective, such a linear process (see Figure 2.10) from score to performance is not particularly favourable: the score is first studied and analysed conceptually (through the use of rules, theoretical concepts and procedures) in order to arrive at a voice-leading graph (an analytical product). After this stage has finished, one looks for the implications of this graph for performance—how it might suggests possible performance interventions. For this purpose, an adequate theory of performance expression would be needed. When, and if, such interventions are found,

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[111] Schenker, *The Masterwork in Music,* Vol. I*,* p. 37.

[112] This quotation comes from material Schenker originally intended for *Free Composition,* although it did not make it into the final version. It is cited in the editor's Introduction to Schenker's *The Art of Performance,* p. xv.

[113] See the editor's Introduction to Schenker, *The Art of Performance,* p. xv.

[114] In "Off the record", Nicholas Cook suggests a different reason Schenker may have never finished this project: "the disconnect between Schenker's theoretical conceptualisation of music on the one hand, and his basic sense of how music goes on the other." While "the mapping of analysis onto performance, of theory onto practice, was possible only on the basis of a modernist style of performance,… - a style of which the first signs appeared in the interwar period", Schenker, as Cook notes, never reconciled himself with this "structuralist" style but favoured a more "rhetorical" one.

the result feels like such theoretical mappings of structural analysis onto performance impose an interpretation on performers.[115] In order for analyst-performers to feel they actively contribute and discover themselves a desired interpretation, a more "circular" process (see Figure 2.11) is necessary, one that engages the body/intuition in addition to, and concurrently with, the mind/intellect. Perceptual, rule-based analysis and performance are not seen as two independent stages in reaching the desired goal but are integrated into one unified process whereby the analyst is "thinking/hearing through the body": as I study and analyse the score with my intellect, I equally engage my bodily intuition in assessing musical meaning. The notes of the score have a potential expressive meaning that needs to be discovered not only through theoretical rules and procedures but also by bodily and intuitively reacting to the notes during an act of performance, whether real or imaginary. At the same time, since the analytical process involves also a performing process, the analytical object is therefore not only the score but also the performance itself, whose expressive meaning can be studied through detailed dynamic, timing and articulation information extracted from the performed music. The result of this integrated kind of analytical process—where analysis is done through performance and the object of analysis is both the score and the way it is or can be performed—is that the product of analysis has *direct* link with the performing process and sound.[116] In fact "analysis *through* performance" can also be understood as "analysis *as* performance": the analytical process is a more analytically-informed performance interpretation, and the analytical product is like a description of, among other things, my performance interpretation, in contrast to an analytical product seen as the starting point for exploring how the score might be performed in light of this analysis. In "analysis through/as performance" this exploration process takes place during the analytical process itself.

[115]This one way mapping of structural analysis onto performance was not suggested by Schenker himself, but by a group of post-war American theorists. See the relevant discussion on this in Chapter 1. While not all theorists have practiced such a strictly one-way process of analysis in relation to performance, as I am trying to argue here, the absence of methods that closely integrate aspects of both compositional and performance structures as well as conceptual and bodily hearing limits how one can approach music analysis in ways that such "linear" kinds of processes may appear inevitable.

[116] The need for such more two-way analytical approaches between theory and performance has been advocated by a number of theorists in more recent years. See, for example, Lester, "Performance and analysis: interaction and interpretation" and Bayley, "Analytical representations of creative processes".

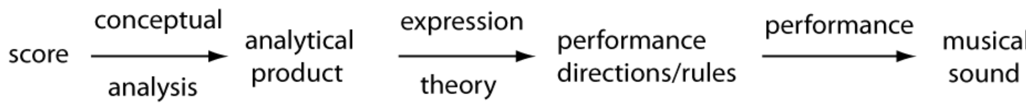

Figure 2.10 "Linear"/diachronic analytical process of linking the score to the performed sound.

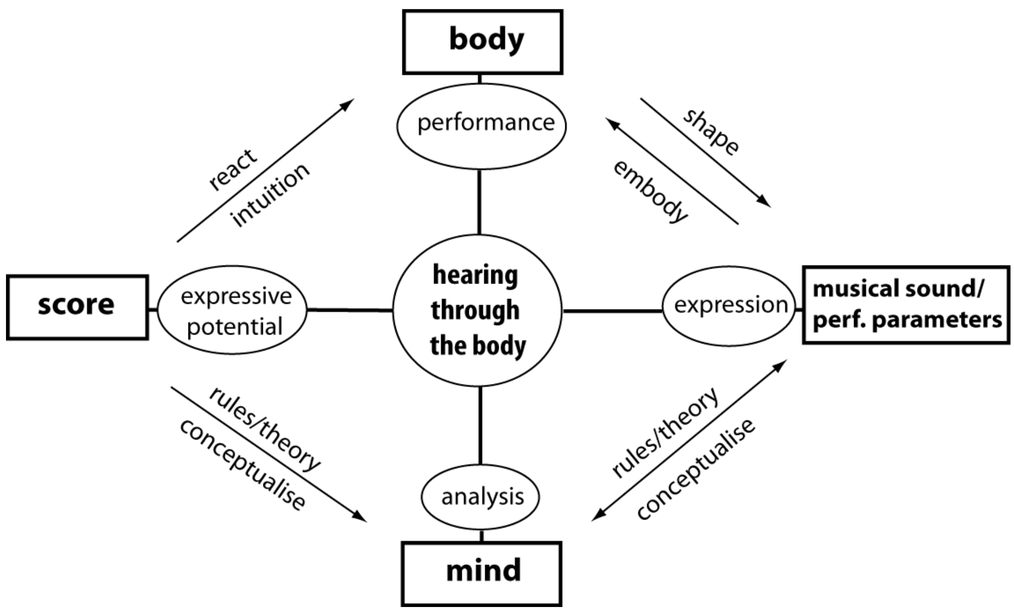

Figure 2.11 "Circular"/synchronic analytical process of exploring musical meaning as embodied sound.

The analytical method that will be proposed in chapters 3 to 5 will elaborate this process in more detail. The product of each analysis will describe in detail the expressive content not only of the musical score but also of specific performance interpretations. For this purpose, crucial will be the analysis of details of the way the notes are performed, something that will be studied in the form of graphs of dynamics and timing information extracted from sound recordings. The importance of considering the performance parameters in analysis will be examined below, by showing how these parameters do not just add expression to the music but significantly influence aspects of traditional kinds of structural function. More specifically, I will revisit (and redefine) the traditional concepts of stability and instability or consonance and dissonance, as used most characteristically by Schenkerian theory, in an attempt to incorporate within their definition motional aspects of musical meaning as manifested in performed music. In the end, what will be shown is that one cannot separate (without consequences) expression and movement from other aspects of structural meaning traditionally theorised in terms of harmony, voice-leading, metre, rhythm, form, and so forth.

2.3 Rhythmicising stability and instability

The idea of the passing effect is a fundamental concept in the way harmony and voice-leading is understood today particularly in the US, where the influence of Schenkerian theory is more widespread. It is most characteristically defined by Fux in his second species counterpoint as the effect of some note which fills out the space between two notes that are a third distant from each other. This idea not only made possible the understanding of music at different hierarchical levels but also brought attention to some of the more dynamic aspects of the way the notes interact with each other. While the emphasis of the idea of the passing effect is that of melodic motion, i.e. the filling out the distance of a third, for example, the more dynamic idea of stability and instability is inherent in this concept. The way stability and instability is typically conceptualised, however, cannot fully describe some of the most subtle and important motional aspects of musical structure. This is, I will argue, because the main criteria used in relation to the passing effect are those of consonance and dissonance, concepts which depend more on pitch relations than on rhythmic, metric and other factors relating to more dynamic aspects of music.

Figure 2.12 a and b show how consonance and dissonance behave to create passing motion. At a, where there is only a single melodic line, the consonant interval of a third formed between bar 1 and 3 creates two stable moments against which the dissonant stepwise motion of the interval of a second is heard. Even though, in this case, the consonant stable interval is horizontal, stability can also be inferred or heard on the vertical dimension. The note E in bar 1, coming first, is heard as stable, most likely representing a triad built on E. The second note D, coming second, is heard in relation to what came before and thus, being foreign to the inferred triad on E, dissonant or unstable. Stability comes back on the third note C, retrospectively associating the first with the third note in the context of a C major triad.[117] Figure 2.12b shows a similar case, where the idea of consonance-dissonance-consonance is much more strongly and

[117] This reading is discussed in detail by Snarrenberg in *Schenker's Interpretive Practice*, pp. 9ff.

unambiguously heard due to the vertical sonorities present. The example in Figure 2.10c has a similarly passing effect with the difference that the third note in the melody returns back to the original note.

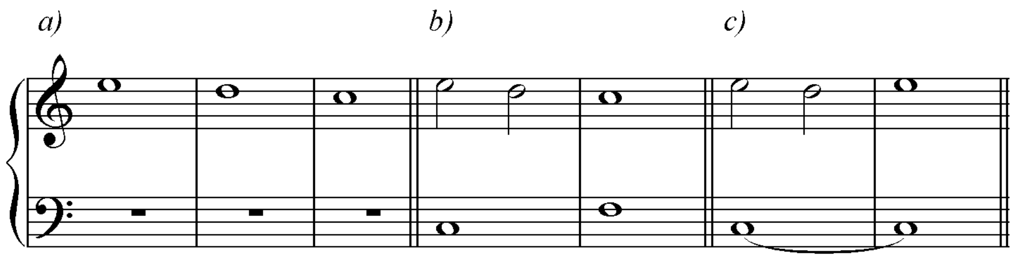

Figure 2.12 Passing motion

The analogy most commonly used for this passing effect is that of a bridge, connecting two stable points. Despite the reference that one can make to the motion of the crossing of the bridge, this motion is conceptualised in relation to the static object of the bridge, as a static connecting matter. The actual passing motion, in other words, is largely unspecified in terms of its precise *motional character*: it only limits itself to just being of passing character, which in Schenkerian theory seems to be only important as far as it is not structurally important and thus reduced out. The expressive richness and beauty of music, however, depends precisely on these very subtle differences of moving from moment to moment in musical *space-time*, as opposed to "moving" just in musical *space*. Music conceived in what could be termed musical space understands notes as static objects connected through static bridge-like conceptualisations. Music conceived in musical space-time, on the other hand, understands notes as continuous moving sound, where what matters the most is the precise character of this moving sound as experienced by any listener.[118]

The expressive richness of music is the result of the interaction of not only melodic and harmonic structural factors but also rhythmic, metric as well as those contributed by performance. Once all structural aspects are considered, the idea of stability and instability can no longer afford such a narrow definition as the one we saw above. In fact, even Fux's definition of passing motion contains more than just the static consonance-dissonance-consonance succession: equally important is the metrical

[118] My use of the terms space and space-time to describe conceptualisations of music is metaphorical and aims to highlight the importance of conceiving music in more dynamic terms. They refer to Einstein's important concept of space-time in physics, which managed to combine space and time into a single continuum.

placement of these verticalities, which have to align with the strong-weak-strong succession. The idea of stability, therefore, contains also the elements of metrical strength as opposed to metrical weakness. With this in mind, the analogy of the bridge used to convey passing motion becomes more rhythmic and dynamic in nature. The bridge aligns now with a metric cycle, a more rhythmic and movement-related concept. In cases where the two do not align, the character of movement changes in interesting ways. Even though the importance of metric placement is acknowledged in different ways in traditional theories of harmony and voice-leading,[119] no adequate theory exists to integrate effectively harmonic with rhythmic stability.

Some of the most characteristic examples acknowledging the importance of metric placement and rhythm on harmonic function include the concepts of "feminine" and "masculine" cadences and various distinctions between different kinds of weak beats (afterbeats or upbeats for example).[120] What's interesting about these distinctions is how they pay attention to the way movement is directed towards and away from focal stable moments. Movement does not simply pass from stable to stable moment but passes in specific ways. In Figure 2.13a, the authentic cadence in Mozart's theme from the A major piano sonata K.331 is of the "masculine" type, meaning that the dominant chord resolves into the tonic anacrustically from weak to strong. By contrast, in Figure 2.13b, the weak to strong metrical position of the V-I cadence weakens its character in the sense that the tonic moment of arrival is deemphasised by being placed on a weak beat. These two cadence distinctions relate directly to those of up-beats and after-beats, the first grouping the weak with the strong beat anacrustically (pointing forwards) and the second grouping the strong with the weak metacrustically (pointing backwards). The latter is particularly interesting in the way the succession of consonance and dissonance does not align with the established metrical strong and weak beats as in the passing effect we saw above. This misalignment creates a dissonant intensification (and destabilising) of the strong beat, which resolves in the following weak beat—our very common "appoggiatura" effect, or tension-resolution from strong to weak beat.

[119] For a historical perspective on the interrelation of tonal function and metre see Caplin, "Tonal function and metrical accent: A historical perspective".
[120] Such distinctions are explored particularly in *A Generative Theory of Tonal Music* by Lerdahl and Jackendoff.

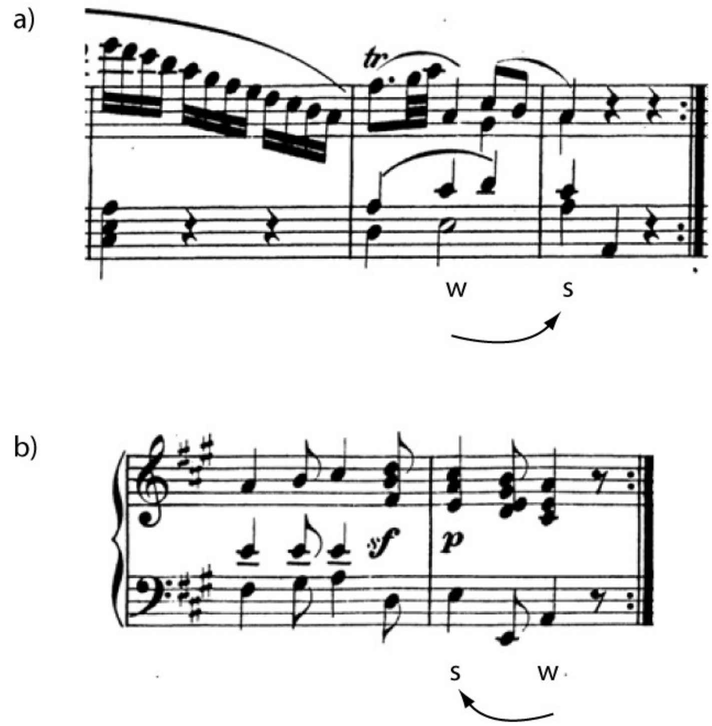

Figure 2.13 Feminine (a) vs masculine (b) cadence types. (Excerpts taken from Mozart's A major piano sonata K. 331, the first from the end of the Minuet and the second from the theme of the first movement.)

Figure 2.14 shows how one could conceptualise movement in this harmonic-rhythmic/metric field. Having integrated metre and rhythm with harmony, the focal or reference point is no longer the stable (and static concept of) consonance but goal moments of this movement or rhythmic process, something experienced similar to downbeats in metric cycles. Each movement (metric) cycle consists of both a Metacrusis, always at the beginning of the cycle, followed by an Anacrusis, which leads into the next cycle. Depending on which side the gravitational balance shifts towards, a movement cycle may emphasise Metacrusis, or the "appoggiatura" effect as shown on the left of Figure 2.14, or Anacrusis as shown on the right. These are graphically represented by backward- and forward-pointing arrows respectively[121]. The case shown in the middle, labelled **"Passing"**, describes the effect of movement that equally (and in most cases, relatively weakly) gravitates towards either side. This can be graphically represented by a slur with an arrow on either side or, in cases where gravitation or momentum is

[121] In "Towards a pedagogy of gestural rhythm", Roger Graybill uses the same symbols—the backward- and forward-pointing arrows—in a similar way to describe gestural rhythmic groups or shapes, as part of a pedagogical approach that teaches the student "how to integrate the processes of thinking and feeling"(p. 44). See also the discussion below under "Gestural Rhythm".

relatively weak, by just a slur joining the two equally stable moments. One thing that this model achieves is the integration into the idea of stability and instability both of tension-resolution—which, in traditional theories of harmony and voice-leading, is almost synonymous with (i.e. not adequately distinguished from) the dissonance/consonance relation—and of rhythmic process relating to goal moments, a concept that comes up more in rhythmic and metric theories. As we will see below, this integration will allow us to see how these two components interact with each other to provide new insights into the meaning of musical structure.

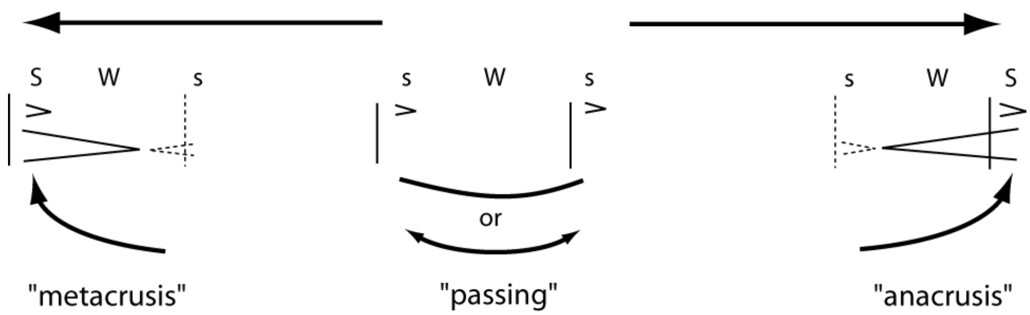

Figure 2.14 Movement in the harmonic-rhythmic/metric field. Showing how motional content can vary within a single movement (metric) cycle.

Performers are particularly sensitive to this dynamic field of movement, and they experience more than anyone else this gravitational pull away from and towards these goal moments. In fact, it is performers themselves who actively shape this movement through actual physical movement as they expressively perform the notes of the score. Consider Schubert's song "Der Neugierige" from *Die schöne Müllerin*. Fritz Wunderlich's performance, as embodied in his 1966 DGG recording (Media Example 2.1), is particularly interesting in the way he moves in this dynamic field. An approximation of the way he shapes phrases through dynamics, articulation and tempo is shown by the added boldface symbols above the score in Figure 2.15a. At the beginning of the phrase, his interpretation is quite straightforward. Moving *with* the rhythm of the structure of the notes, he allows the quavers of bar 23 to move anacrustically into a dynamically stressed downbeat on the next bar, highlighting the C♯ appoggiatura before it resolves in the following weak beat. As he progresses, however, he begins to push against the natural rhythm of the established bar-long movement cycles: the dynamic emphasis on the last note (C♯) of bar 24, in combination with the following decrescendo, changes the gravitational balance of the music by allowing this last beat to become the focal moment, instead of the expected arrival on the downbeat of bar 25. As a consequence, the experienced function of the melodic line at that point changes too: the C♯ at the end of bar 24 is no longer experienced as a mere melodic passing note (as a traditional kind of score analysis would say), an unaccented passing dissonance moving to an accented structural stable pitch, but instead as an *accented* (focal) dissonance resolving to a relatively unaccented stable (and more structural) pitch. Even though when we analyse only the score, in other words, this C♯ *looks* like a passing note, when it is performed in the manner of Wunderlich it has an experiential character and function similar to an appoggiatura, metrically positioned in such a way that absorbs the strength of the following notated (but also experientially established through expectation) metrical downbeat. My voice-feeling graph of Figure 2.15b shows how the strength of Wunderlich's emphasis on this moment tends to displace the established metrical downbeat as shown by the dotted barlines. The experiential effect is one where the two barlines (the notated one of the score and the dotted one of the graph), or metrically focal moments, compete for salience, resulting in a temporary metrical ambiguity.

Compare Wunderlich's interpretation with Dietrich Fischer-Dieskau's (1961)(Media Example 2.2), as shown in Figure 2.16, where the same note C♯ is performed with a passing motional character—that is, with a weakly shaped Anacrusis moving comfortably between two equally accented downbeats. (Recall that the slur indicates a movement cycle between two equally stressed movements where the processes of Metacrusis and Anacrusis of each cycle have a relatively weak balancing character.)

Figure 2.15 Fritz Wunderlich's performance of Schubert's song "Der Neugierige" from *Die schöne Müllerin*. A) performance score; and b) voice-feeling graph.

Figure 2.16 Dietrich Fischer-Dieskau's performance of Schubert's song "Der Neugierige" from *Die schöne Müllerin*. A) performance score; and b) voice-feeling graph.

What such an interpretation of melodic function shows is that, as Patrick McCreless put it, following Ernst Kurth's work, the "essence of melody…involves not merely tone-succession, but rather psychic motion—that tension which gathers individual tones into a single gesture and connects them into a comprehensible unity."[122] It also draws a distinction between abstract structural relations determined by doing more conceptual kind of score analysis and musical function determined by experiencing a specific interpretation of the piece. In the first case, all such structural relations of a more abstract nature have various potential meanings that need to be explored through experiencing, hearing or performing of the music, and, in the second case, it is the way one experienced the music at a given moment. Furthermore, given the interdependence of performance parameters with music experiencing, we need to be very careful how we understand abstract kinds of analysis and function, which only considers the compositional structure of music. If our goal is to talk about how we have actually heard music, we have to consider a specific performance of a piece and the way this performance has influenced the potential structural meanings of the compositional structure.

One of the difficulties with analysing the "psychic energy" of melodic lines is its subtle, but important, variation in performance interpretation, something that is difficult for analytical languages to capture accurately and effectively. While, in theory, the model proposed in Figure 2.14 conceptualises movement in a continuum of dynamic pull ranging from Metacrusis to Anacrusis, in actual music analysis one has to choose one of the three functions shown, even when at times we may experience an intermediate category. Later in Schubert's song, for example, when the same passage repeats, Wunderlich puts more emphasis on the downbeat D of bar 25, so that the effect of the displaced appoggiatura is weakened, approaching more the passing effect.[123]

As expected, such changes in the dynamic of melodic movement affect in a similar way harmonic charge and interpretation. Fischer-Dieskau's performance of bars 25-26, for example, is, as was the case with bar 24, rather straightforward in the sense that the amount of "weight" given to the three melodic notes corresponding to the bass

[122] McCreless, "Ernst Kurth and the analysis of chromatic music", p. 58. Kurth's idea of "psychic energy" in relation to music is based on Freud's work on psychoanalysis, which understood this in terms of transformation of somatic energy and psychological forces such as drives, motivations, intentions, desires, conflicts etc.While this explanation for felt experience was largely metaphorical, it is important and has in recent times been succeeded by work in neuroscience. Stern's work on "forms of vitality", which will be visited again in chapter 3, is such a more contemporary attempt to explain the same phenomenon. See Stern, *Forms of Vitality*, especially chapters 3 and 4.

[123] The model of expressive movement to be proposed in chapters 3-5 (which is a more detailed model of the one of Figure 2.14) will make possible the graphic description of intermediate categories by treating structural function as a matter of degree.

arpeggiation B-D-F is about the same.[124] At the same time, the anacrustic and metacrustic processes of bar 25 are relatively weak and comfortably balance each other. As a result, at the bar-long level of structure, the third crotchet beat of bar 25 is perceived as a "passing" sonority (i6), connecting the minor tonic that supports $\flat\hat{3}$ on the downbeat of bar 25 and the dominant that supports $\hat{2}$ on the downbeat of bar 26. The resulting harmonic interpretation is shown in Figure 2.16b, an outlining of the downbeat chords i and V, a half cadence in B. The situation is different in Wunderlich's interpretation which, as shown in Figure 2.15a, emphasises more the second D (on the word "du") in bar 25. The tension initiated on this second D is intensified further on the following high F♯ to gradually let tension release through the end of the phrase. As in the previous bar, the projected effect is that of a metacrustic gesture for the whole "du heut so stumm" phrase, something that has direct influence on the voice-leading reading of the passage: while the first D in the vocal part in bar 25 is a structural (stable) $\flat\hat{3}$, the second D in the same bar behaves like a "dissonance", an unstable (and focal) pitch that resolves down by half step to a structural $\hat{2}$ (see Figure 2.15b). This 6-5 motion in the specific context calls for an interpretation where the i6 chord is not grouped as an arpeggiated motion with the previous root position tonic but as a suspended motion over a dominant. To indicate the experienced harmonic function of this apparent i6 chord, an imaginary bass F♯ has been added below the second D in bar 25 (see Figure 2.15b). (Recall that voice-*feeling* graphs are primarily intended at showing the dynamic, gestural character of music and not simply voice-leading connections as in Schenkerian voice-leading graphs. Thus, the "imaginary" V^{6-5}_{4-3} motion here should not be taken as representing something literally perceived as such but as capturing the essential dynamic character of the corresponding music. Compare this interpretation with Schachter's Example 4.2c, reproduced above in Figure 2.5).[125]

The theme from the first movement of Mozart's A major piano sonata K.331 (Figure 2.17) provides another example where an apparently stable tonic triad can be experienced as unstable in relation to its immediate context if performed in certain ways.

[124] By "weight" here I mean the overall sense of emphasis given to each accented moment as judged intuitively by a listener. This is shaped mainly by the dynamic stress of the note sung on those moments as well as by the strength of the anacrusis that prepares each of these moments. No attempt is made here to quantify the parameters involved in shaping this weight of each focal moment. Chapter 4 and 5 will examine in more detail the structural factors (both of the compositional and performance structures) involved in shaping structural "weight".

[125] Note here that a focal event (the accented event occurring at the beginning of a motion cycle) is not always the most harmonically stable and structural. This is the case with Fisher-Dieskau's interpretation at bars 25-26 but not with Wunderlich's.

In addition, it provides a good example of how the structural importance of a predominant chord can vary depending on performance interpretation. Figure 2.18 shows the structural content of three different (imagined) performance interpretations of the third and fourth bars of the piece.[126] They have been on purpose designed to show exaggerated differences in interpretation in order to make my point more clear. Even though, in this specific style and genre, such performance differences will only be very subtly heard by the listener, they are very important to the performer, who needs to have a very concrete idea of the gestural patterns necessary in order to project them effectively during performance. Figure 2.18a shows a cadence similar to the one of bars 25-26 of Neugierige (Figure 2.15) discussed above, although the cadential $^{6}_{4}$ in this case is not displaced but occurs on the downbeat of the bar 4. The way this is performed, by de-emphasising (by means of a decrescendo) the second half of bar 4, the "notated" or apparent cadential $^{6}_{4}$ at the very end of the phrase is no longer as prominent or structural; it becomes a lower-level embellishing structure, and, instead, another more gesturally important cadential $^{6}_{4}$ occurs right on the downbeat of the bar. What, on the downbeat of bar 4, looks like a stable tonic in root position is in fact perceived more as an unstable $^{6}_{4}$ chord demanding resolution to the following $^{5}_{3}$. The crescendo and decrescendo signs shown in Figure 2.18a, and the accent on the downbeat of bar 4, are only the most obvious and objectively measurable aspects of this interpretation. For the performer and listener, it involves the internal bodily experience of the motional content represented by the arrows—the gradual build-up of tension that drives motion anacrustically into the downbeat of bar 4 and the gradual decrease of tension through the rest of the phrase. This is what a performer needs to experience in order to project effectively this interpretation (as opposed to mechanically executing dynamic and articulation marks) and how a listener needs to internally react in order to deeply experience the intended meaning of this interpretation.

[126] Unlike the previous example, where I worked from specific performances of the Schubert song to their underlying interpretation, here I start from alternative underlying interpretations to possible performance expressions. Nevertheless, the approach is essentially the same: analytical interpretations are mapped onto performance interpretations.

Figure 2.17 The theme from Mozart's A major piano sonata K.331, first movement, bars 1-18.

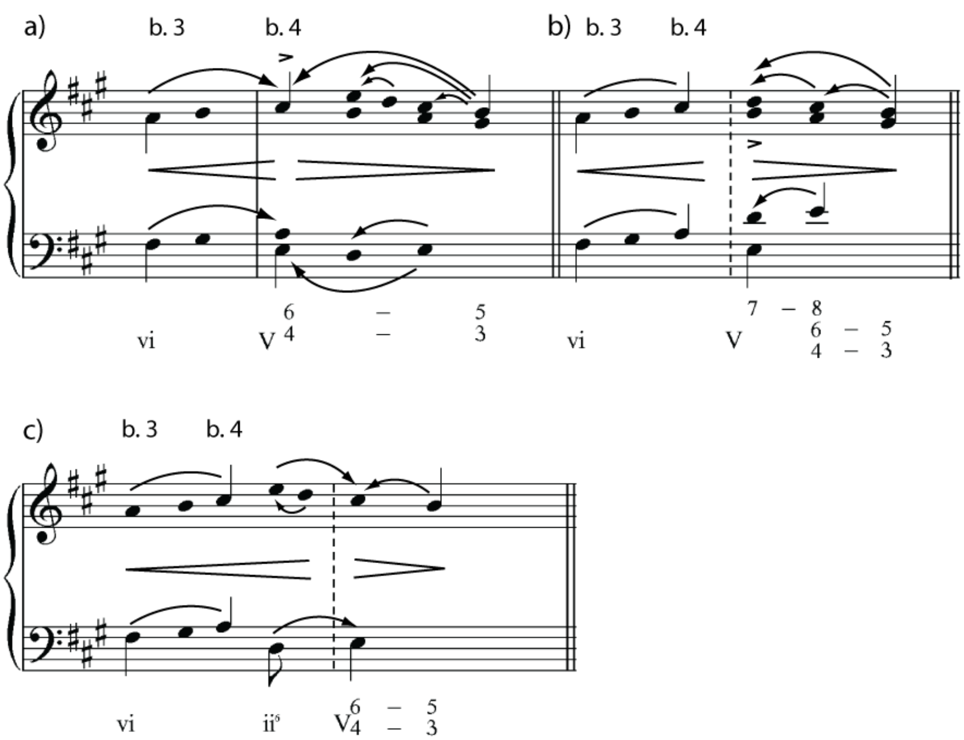

Figure 2.18 Voice-feeling graphs of three different performance interpretations of bars 3-4 from the theme of Mozart's A major piano sonata K.331, first movement.

The interpretation shown in Figure 2.18b shifts the focal moment two quavers later, treating the downbeat tonic chord of bar 4 as an extension of the music of the previous bar. As a result, this tonic chord groups with the preceding ascending melodic movement and, as suggested by the voice-feeling graph, it is subsumed by the submediant chord of the downbeat of bar 3, which initiates a prolonged predominant, building up tension on the way to the dominant. The expected arrival occurs a bit delayed on the sforzando ii6 chord, which supports a leap to the high E followed by a descending closing melodic gesture. (Note here how this shift of goal or focal moment is represented by the dotted barline.) The specific placement of the metacrustic gestural pattern on this moment creates a double "appoggiatura" effect over a dominant bass note: first with the ii6 chord, which is transformed from an apparent predominant to an experienced "appoggiatura" chord resolving into the following $^6_4$ chord (hence, the "sub-posed" bass E with the occurrence of the ii6 chord); and then with the more obvious $^6_4$ chord at the middle of bar 4 resolving into the dominant $^5_3$ chord.

By contrast, Figure 2.18c shows how an Anacrusis, which drives the music into the middle of bar 4, emphasises and, in consequence, gives full meaning to the apparent cadential $^6_4$. In addition, the preceding ii6 chord acquires the higher status of a structural predominant, due to its anacrustic charge on the way to the following accented V^6_4. In this case, the predominant ii6 fulfils its "real" function, which is to prepare the arrival of the dominant. Compare how this same chord functions in Figure 2.18a, where its structural importance is decreased due to its rhythmic placement and the fact that it occurs *after* the structural bass of the V^6_4 has occurred. In this case the ii6 is only a low-level embellishing "appoggiatura" chord, in contrast to the way it occurs in Figure 2.18c, where it is perceived as a higher-level structural chord supporting scale degree 4 in the bass.

A "simpler" or more unnuanced interpretation of the Mozart theme would give about equal weight to each harmonic change, without allowing the listener to hear the music in terms of larger gestural patterns. The sforzando provided in the edition of the score given in Figure 2.17, however, suggests an interpretation such as the one of Figure 2.18b. Likewise, the accent suggested by Schubert on the third beat of bar 28 in "Der Neugierige" seems to suggest an interpretation like the one shown in Figure 2.19. The predominant ii6 chord on the downbeat of bar 29 and its preceding applied dominant are mere (experienced) successive appoggiatura chords over a dominant-functioning bass. By contrast, 20 bars later, when the same music comes back, those same harmonies take new meaning in their new context (see Figure 2.20): rather than being supported by a descending melodic line after an upward leap to a high F♯ (as previously, in bar 28), the applied chord to the ii6 in bar 48 is supported by an ascending chromatic line. As a result, this time, the applied chord is given a more anacrustic, rather than metacrustic, quality. The interpretation of the phrase shown in Figure 2.20b highlights a background harmonic structure that allows for a more gradual build up of momentum to the final cadence. Rather than giving anacrustic character to both the apparent predominant and dominant chords of bar 48, this interpretation holds back momentum through two successive metacruses: the first, at the beginning of bar 48, stabilises the otherwise unstable apparent V^6_4 by accenting and thus destabilising the suspended ii6 chord over the following tonic chord; the second, beginning on the third crotchet beat of bar 48, turns an apparently anacrustic dominant (given its notated metric placement) into a displaced appoggiatura chord resolving into the submediant chord of the following bar (in the voice-feeling graph, the music has been rebarred to reflect the experienced metric/gestural effect). What on the surface of the music looks like a deceptive cadence (V-vi, bars 48-49) becomes part of a broader descending third motion (I-vi-ii6) on the way to the final authentic cadence.

Figure 2.19 a) Schubert's song "Der Neugierige", bars 27-30; b) harmonic-rhythmic reading

Figure 2.20 a) Schubert's song "Der Neugierige", bars 47-52; b) voice-feeling graph.

Though a bit unconventional, the above reading, where more priority is given to the overall dynamic character of chords rather than their more literal harmonic construction, does not lie outside the tradition of harmonic theory. Schenker himself, for example, talks at times about chords that look one way in the score but function another way. Commenting on the Scherzo from Beethoven's third Symphony, bars 15-17 (Figure 2.21), he notes that, "despite the thoroughbass figures $^6_4$, the fourth is illusory":[127] the apparent $^6_4$ chord here sounds like a stable E♭ chord in root position, just as in Figure 2.20 the apparent $^6_4$ chord in bar 48 was read as an experienced stable tonic chord. In a different example from *Free Composition*, one can get an idea of Schenker's understanding of how voice-leading and harmony interrelate with rhythm and metre. In the chapter on Syncopation (or Suspension), he comments as follows on his Figure 63/1, reproduced here as Figure 2.22: "Because of the chord progression in the foreground, a suspension over IV must be assumed, even though the bass tone is not stated until two measures later".[128] (The arrow pointing towards the "assumed" A♭ bass note is Schenker's own symbol.) In *The Masterwork in Music,* volume III, he insists on the same reading, pointing out that "the D♭ seventh of horn 2 in bars 235-7 serves to tonicize IV; as early as bar 237, therefore, this chord ought to be construed as IV^9_4, even though the

[127] Schenker, *Free Composition*, p. 56.
[128] Ibid., p. 65.

root A♭ is not yet present because of the A♭ in bar 239”.[129] Even though, here, it is clearer that he chose this reading in order to acknowledge the tonicization of A♭, it nevertheless shows sensitivity to the rhythmic nature of chordal functions. Similarly, the way he chooses to verticalise chords at different levels in his graphs might also be understood as an attempt to capture important rhythmic aspects of harmonic motion. An example can be seen in his graph of Bach’s chorale “Ich bin’s, ich sollte Büssen” from *Five Graphic Music Analyses,* reproduced here as Figure 23. In the final cadence of the chorale, the IV^7 chord shown in levels 2 and 3 is aligned with a V^6_4 in the first level. Even though there is nothing in his graphic notation to suggest that he thought of (or experienced) this IV^7 chord as a “suspension” chord, the way he verticalised the graphs suggests that the bass note E (the structural dominant) is in effect from the beginning of the bar.

Figure 2.21 Scherzo from Beethoven’s third Symphony, bars 10-23.

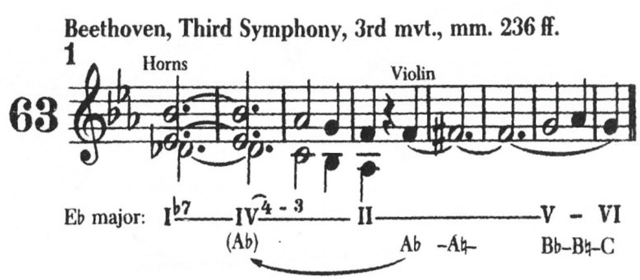

Figure 2.22 Reproduction of Schenker’s Figure 63/1 from *Free Composition*.

[129] Schenker, *The Masterwork in Music*, Vol. III, p. 50.

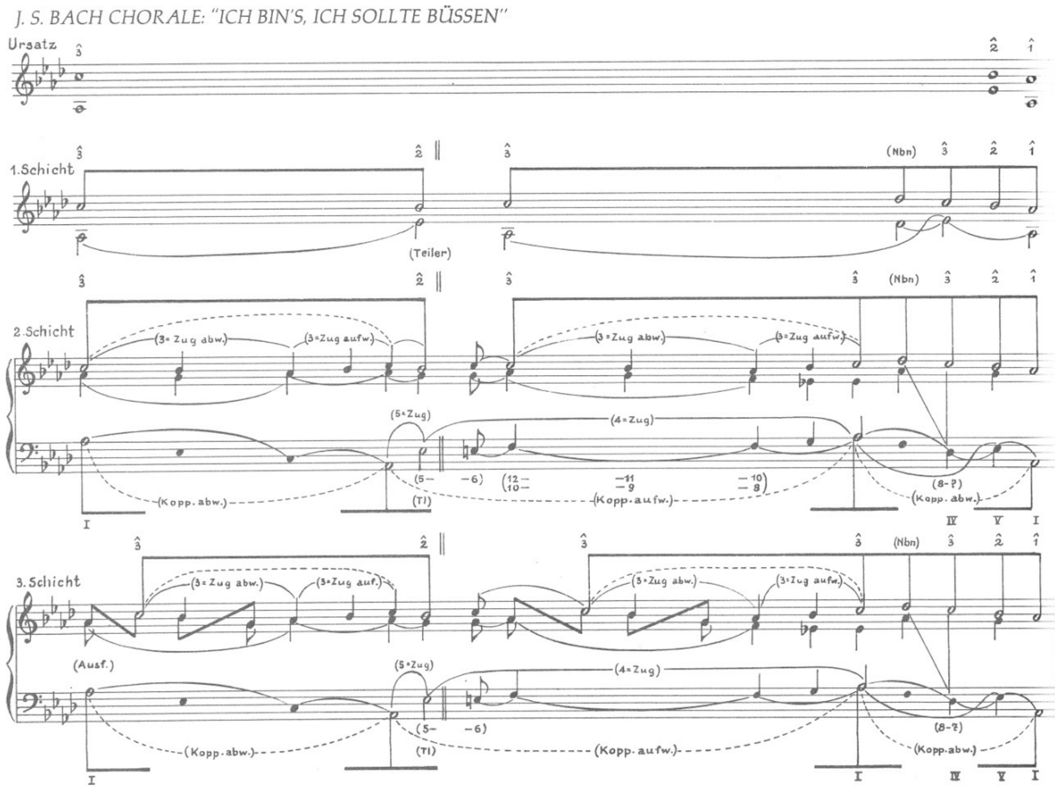

Figure 2.23 Reproduction of Schenker's graph of Bach's chorale "Ich bin's, ich sollte Büssen" from *Five Graphic Music Analyses.*

2.4 Gestural process at the forefront

Despite those few places where Schenker hints at the interaction between tonal motion and rhythm, his graphing system in general remains largely arrhythmic, conveying little information about the rhythmic nature of harmonic motion. And while no theory can ever be expected to show all aspects of musical structure, the limitations of certain theories can be a problem especially when they are used in ways that go beyond their scope. My observations about Schenkerian theory and notation (or any other theory and analytical method), in other words, should not necessarily be taken as criticism of the theory itself but as evaluation of the extent in which this system can be useful for specific pedagogical purposes. I have already suggested how it might be particularly limiting for what performers and listeners might benefit the most from. It is also particularly limiting, however, when Schenkerian-like conceptualisations of tonal structure becomes the basis for teaching tonal composition. As it happens, the way many theorists understand Schenkerian theory today is such that it explains tonality as a whole (see Matthew Brown's Schenkerian book titled *Explaining Tonality*, for example, or how many graduate tonal theory courses in the US today teach only Schenkerian theory and analysis), in a way that certain important aspects of tonality are neglected. This divorce of harmony and voice-leading from rhythm and metre is especially consequential for compositional theory. For centuries, one of the main goals of theories of harmony and counterpoint has been the teaching of basic or even more advanced composition. The theoretical emphasis in such theories does not only imply what is most important in musical structure in general but also what *should* be the focus, and in which order, during the actual compositional process. Debates on the nature of harmony throughout the history of music theory, for example, were at the same time debates on how composers compose or should compose: whether one should first write a melody and then harmonise it, or whether harmony and melody should be conceived all at once, whether the emphasis should be on horizontal thinking or more vertical, whether one should start from a harmonic framework and elaborate it later on or let thematic ideas guide the rest, and the list goes on.[130]

Even though Schenker makes it clear that the process of generation of the foreground from the background does not convey any information about the chronology of the actual compositional process, but shows only logical relationships between simple and more complex structures,[131] it nevertheless provides a rather practical and systematic way of composing music, at least for beginners. After all, the practice of diminution or elaboration of simple chord progressions or contrapuntal frameworks has been the classic way of teaching beginning composition for centuries. At its most extreme case, it can perhaps be seen in Matthew Brown's Schenkerian-inspired procedure for composing typical tonal melodies (see Figure 2.24).[132] One first chooses a final tonic for the melody as a whole, and then fixes the opening note (a choice from $\hat{8}$, $\hat{5}$, $\hat{3}$ or $\hat{1}$) and the final cadence, a stepwise descent onto the tonic. Then after deciding on the climactic note about two thirds through the melody, the opening tonic is reinforced through some tonic expansion before the rest is filled in with notes that create a good overall melodic shape. Though this procedure is not coming from a manual of composition, it is nevertheless suggestive of the direct influence the way we nowadays theorise about musical structure has on the way we teach musical composition. By assuming the independence and priority of pitch structure over other kinds of structures, compositional instruction monopolises harmonic, voice-leading and melodic/motivic aspects of structure at the

[130] For a detailed examination of such debates in compositional theory in the 18th century see Lester, *Compositional Theory in the Eighteenth Century.*
[131] Schenker, *Free Composition*, p. 18.
[132] Brown, *Explaining Tonality,* pp. 4-5.

expense of rhythmic aspects. Apparently, in Brown-like compositional procedures, rhythm and metre is supposed to be added later on, being only surface details of secondary importance. The crucial question, however, lies in which stage in the musical conception or compositional process aspects of rhythm come or should come in. This question is important not for judging the validity of Schenker's theory but for deciding to what extent and in what ways such a theoretical system can form the basis for an effective compositional instruction. Can composers write good tonal music by conceptualising arrhythmic pitch structures divorced from rhythmic and other more dynamic musical aspects? To what extent do the initial and most important aspects of composers' musical conceptions and desired effects involve overall gestural patterns rather than abstract pitch structure frameworks? Are issues of gesture and expression only the concern of performers?

Figure I.2. A procedure for composing typical tonal melodies.

a. Pick a final tonic for the melody as a whole.

$\hat{1}$

b. Begin the melody on $\hat{8}$, $\hat{5}$, $\hat{3}$, or $\hat{1}$ and end with a stepwise descent onto the tonic.

Cadence

$\hat{3}$ … $\hat{2}$ $\hat{1}$

c. Pick a climax about two thirds through the melody and not more than an octave above the tonic.

Climax Cadence

$\hat{3}$ … $\hat{4}$ … $\hat{2}$ $\hat{1}$

d. Reinforce the tonic at the opening.

Climax Cadence

$\hat{3}$ $\hat{4}$ $\hat{7}$ $\hat{1}$ … $\hat{4}$ … $\hat{2}$ $\hat{1}$

e. Join the opening to the climax and the climax to the cadence.

Climax Cadence

$\hat{3}$ $\hat{4}$ $\hat{7}$ $\hat{1}$ $\hat{2}$ $\hat{3}$ $\hat{4}$ $\hat{2}$ $\hat{1}$

f. Fill in any details and check to see that the melody has a good overall shape and that it satisfies any general laws of melodic motion.

Climax Cadence

$\hat{3}\hat{2}\hat{3}$ $\hat{4}\hat{6}$ $\hat{7}$ $\hat{1}$ $\hat{2}$ $\hat{3}$ $\hat{4}$ $\hat{2}$ $\hat{1}$

Figure 2.24 Reproduction of Matthew Brown's Figure 1.2 from *Explaining Tonality.*

While it is true that different composers have different approaches to composing and no single recipe can be found that works for everybody and for all styles of music, it is hard to imagine that composers' conception of musical ideas is in such a lifeless form as suggested by Brown's top-down compositional procedure. On the contrary, very early in the compositional process, musical ideas are normally conceived and constantly reworked as complete gestural-rhythmic-melodic-harmonic-etc. entities.[133] Below I suggest a way the structural meaning of these musical ideas can be conceptualised by integrating gestural rhythm with (i.e. rhythmicising) more traditional harmonic/voice-leading structural readings. In Chopin's Mazurka in A minor, Op. 67, No.4 (Figure 2.25a), how can one describe the main idea of the piece stated in the opening bars? Behind the melodic and harmonic surface lie important rhythmic features, which give the Mazurka its specific character as dance music. Figure 2.25 attempts to capture these rhythmic/gestural aspects of the main musical idea by juxtaposing the actual music with rhythmic/metric reductions of it. My analysis emphasises by bringing to the surface the way overlapping displaced metacrustic gestures (see the backward-pointing arrows in Figure 2.25b) conflict with the notated metre to create a particular dancing feel. (To reflect the experienced metric/rhythmic feel in the two graphs, the music has been rebarred and vertically aligned with the actual notated music.) This idea translates into a more background structure that, unlike a typical Schenkerian one, retains the rhythmic character of harmonic function: bars 2 and 4 are not considered as mere "passing" or embellishing chords that will be reduced out at a relatively high structural level, as in a typical Schenkerian reading; they are, rather, integrated into the core of the thematic idea of the piece. The emphasis that the mordent puts on the weak third beat of bar 1, combined with the de-emphasis of the following notated strong beat (given the absence of a bass note in the left hand), suggests a reading such as the one shown in Figure 2.25b: a suspended unstable tonic chord over a dominant bass. Overlapping with this gesture, at the moment this unstable tonic chord resolves two beats later, occurs another metacrustic gesture suggested by the way motive "y" (the inversion of motive "x", which occurred with the onset of the first Metacrusis—see Figure 2.25a) clashes harmonically with the dominant seventh chord of the left hand to demand resolution two beats later on a stable tonic chord. (See how the character of this Metacrusis has also been captured in the graph by the 6-5 suspending motion over the bass E at that moment.) At the more background level (Figure 2.25c), these overlapping metacrustically-charged melodic/gestural ideas are combined into a single suspending motion over a tonic chord

[133] My understanding of "musical idea" in the composing process is not unlike Schoenberg's: "Composing is: *thinking in tones and rhythms*. Every piece of music is *the presentation of a musical idea*." "A musical idea, accordingly, though consisting of melody, rhythm, and harmony, is neither the one nor the other alone, but all three together. The elements of a musical idea are partly incorporated in the horizontal plane as successive sounds, and partly in the vertical plane as simultaneous sounds." Quoted in Arnold Schoenberg, *The Musical Idea and the Logic, Technique, and Art of Its Presentation,* p. 15.

supporting the melodic descending third $\hat{5}$-$\hat{4}$-$\hat{3}$. A corresponding interpretation occurs in bars 3-5, completing the melodic descent down from the third to the first scale degrees.

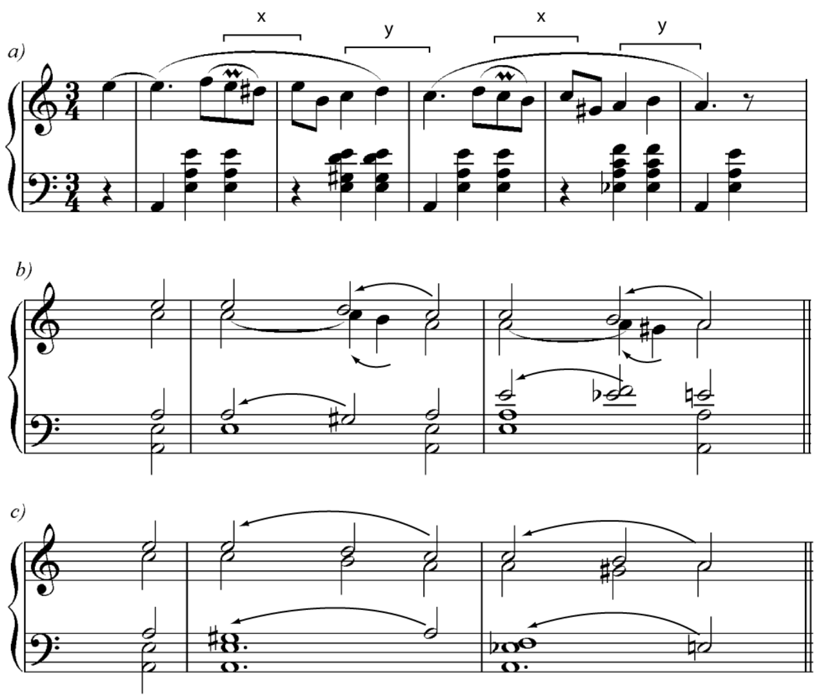

Figure 2.25 a) Chopin, Mazurka in A minor, Op. 67, No.4, bars 1-4; b) and c) rhythmic/metric/gestural reduction.

Even though the music may appear deceptively simple and unextraordinary, underlying gestures like these are what give richness and expressive meaning to music. These are the kinds of qualities that performers search for in the music in order to make full justice and transform the music into a new level of artistry. Dmitri Bashkirov's performance (mid 50s) of this Mazurka reacts particularly positively to these underlying gestural patterns suggested in Figure 2.25, bringing them to the surface with apparent conscious effort.[134] (Note how in this performance interpretation the music tends to be experienced in a metrically re-barred way, as shown in these graphs.) In the hands of Evgeni Kissin (1997),[135] on the other hand, these suggested gestural patterns become more of a means for creating a more elastic and freely flowing music. Rather than forcefully emphasising the third beat of bars 1 and 3 to project an unambiguous re-barring of music as in Bashkirov's interpretation, he tastefully puts only moderate

[134] Listen to Bashkirov's performance at http://www.youtube.com/watch?v=SymuBxWm5-s.
[135] Listen to Kissin's performance at http://www.youtube.com/watch?v=qgOzDDPlFjI.

pressure on these weak beats to balance them out with the notated strong beats. (Different performers, of course, may choose to emphasise different aspects of musical structure so that my reading shown above does not apply.) In conclusion, the point I want to make with this example is that such gestural/expressive aspects of music should not be seen as something that emerges only after the performing process (changing accordingly structural meaning as experienced by listeners) but that their seeds lie to a large extent deep in the compositional structure of music. Since such gestural processes are normally part of the composer's initial conception but also of later reworkings of musical ideas, they should be integrated within our conceptualisation of musical structure, both in music analysis and especially in the learning process of musical composition. This would minimise the risk of writing pieces whose main musical ideas lack an essential gestural and expressive character as is so often the case particularly with beginning student's compositions.

Gestural/expressive character and process is important not only for relatively short musical ideas such as the one I considered above, but also for larger sections or compositional processes. These will be briefly discussed below. Consider for example the opening section of Beethoven's piano sonata in C minor, Op.10, no.1 (Figure 2.26). One cannot help but notice the carefully planned gestural path through which Beethoven allows the first 30 bars to make a clear opening statement. What's remarkable is the way the opposing forces of metacrustic and anacrustic gestures fight for dominance as we move from a predominantly metacrustic opening idea to its gradual transformation into an anacrustic one. The **"emotivic"**[136] analysis of Figure 2.27 traces this transformation process. The beginning of the piece asserts its character right away with two contrasting ideas: a loud ascending arpeggiation sprung out of and tightly controlled by a forceful C minor chord, followed by an answering soft descending suspension. As the graph shows, both by themselves and in relation to each other, these ideas are metacrustically charged—that is, they are all absorbed by the strength of the opening chord. The same idea repeats sequentially in bars 5-8, after which a new descending melodic idea enters to balance out and provide a continuation to the opening part, while bringing the first phrase to a temporary closure in bar 16. As in the first part of this phrase, this continuation is dominated by metacrustic gestures. At the same time, however, a latent force of opposing character gradually emerges right from the beginning. This is the

[136] "Emotivic" here refers to the understanding of motive as bodily gesture. The analysis therefore represents a way of hearing the music as bodily gestural process. Even though no reference is made to specific performances, as in the previous example, or to imagined performance interventions (articulation and dynamics/tempo shadings), anyone reading such graphs and recreating these bodily processes while imagined the musical sound is essentially providing the appropriate performance expression as well.

anacrustic force, first encountered as an innocent preparation to the suspension in bar 3 (and later in bar 7), and gradually acquiring more strength (see the ascending arpeggiations leading into the downbeats of bars 9-11, which result in relatively stronger anacruses), to eventually become the dominant force in the second half of the passage (bars 17-30). This reversal of "emotive" character, coinciding with a metrical shift around bars 16-17, is partly encouraged by the way the two nested sentence structures of the first 16 bars give a forward-moving and increasing "tensing" feel to the whole section. The second half of the section is a constant repetition of a series of V-I motions in the tonic key, with a forceful cadential character made possible by their strong anacrustic charge. Note especially how the opening arpeggiation, which was part of a metacrustic gesture, has now been assimilated into the new anacrustically charged process (bars 22-26).

Figure 2.26 Beethoven, Piano Sonata in C minor, Op.10, No1, first movement, bars 1-30.

Figure 2.27 “Emotivic” analysis of Beethoven’s piano sonata in C minor, Op.10, No.1, first movement, bars 1-30.

The first 24 bars from the third movement of Beethoven’s piano sonata Op.7 (Figure 2.28) show a similar “emotive” process. As the graph of Figure 2.29 illustrates, the first 12 bars are full of “metacruses”, both at the more surface level (top graph) and at higher levels of structure (lower graph). My rhythmic/voice-leading reduction here aims at highlighting the gestural content of the piece experienced as a specific performance interpretation: the opening 6/4 chord dominates the first two bars to eventually resolve in bar 4 (see the top graph). At the four-bar hypermetric structure (see the lowest graph), this whole first four-bar unit is experienced as an extended V6/4, keeping the tension relatively high to allow for a more continuous, forward moving phrasing. Similar voice-leading/gestural content occurs during the second four-bar hypermetric structure. After a second attempt of the opening phrase in bar 9, the music takes a sudden turn away from the previous metacrustic environment, to an anacrustic one. What is unique about this process of reversal is that it is not prepared gradually as in the previous example but happens quite abruptly. As result, "resistance" occurs soon after the reversal takes place: this is first seen in bars 13-14, where the anacrustic two-bar phrase conflicts metrically with the established four-bar hypermetric structure (an expected strong-weak hypermetric feel is reversed into a weak-strong one). Resistance and conflict continues in the following bars (16-19), where the left hand "refuses" to give in to the anacrustic momentum dominating the passage by playing syncopated "suspensions" that conflict metrically with the right hand. This resistance is finally overcome and a prolonged anacrustic scalar passage in the right hand dives triumphantly into a bass B♭ and a cadence in the dominant key.

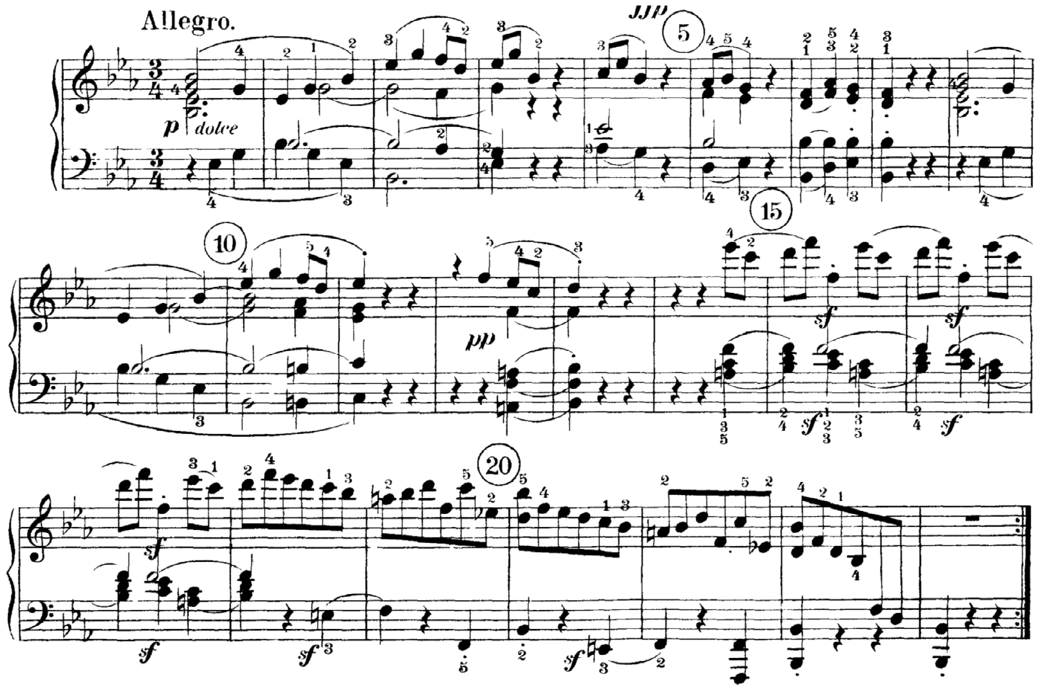

Figure 2.28 Beethoven, piano sonata Op.7, third movement, bars 1-24.

Figure 2.29 "Emotivic" analysis of the Beethoven's piano sonata Op. 7, third movement, bars 1-24.

In both the above Beethoven analyses, my focus was the kinds of gestural processes I read in the structure of the notes, which reflect, at the same time, the way I imagine the notes performed and gesturally/bodily experienced. Different performers may or may not choose to concentrate on and project these processes in their performances but focus on other aspects of structure that they consider important. Nevertheless, such kinds of processes are always present (even if unconsciously) and they are very fundamentally important both for what composers and performers do and for what listeners perceive since they capture important rhythmic aspects of our bodily experience of music. Here I use the word "rhythmic" in a more general sense to denote the dynamic, motional aspect of musical experience, which includes rhythmic and metric elements as well as pulls and attractions, and tension and relaxation. This is why when I previously considered harmonic and voice-leading structures from the real-time, bodily experiential point of view, aspects of rhythm and meter could not have been avoided. In fact, the argument was that if I want to talk about the real-time, dynamic experience of musical structure, I need to talk about it in rhythmic/gestural terms (hence my attempt to "rhythmicise" harmonic/voice-leading structures). Separating, in other words, the rhythmic/metric from other aspects of musical structure encourages an analytical or thinking process that distracts one from those more immediate and visceral qualities of music that most performers and listeners feel closer to and find more meaningful.

The following sections will continue to look at various traditional theories of music structure, now with emphasis on metric and rhythmic theories, where similar issues apply here as well. Depriving rhythm and meter of their dynamic aspect renders them equally abstract (that is, unable to engage bodily-centred, real-time aspects of experience), and thus in many ways pedagogically weak. Such was Roger Graybill's concern when he came up with a pedagogy of gestural rhythm. For Graybill, rhythm is more than mere abstract temporal relationships or a neutral series of attack points and durations. As he notes, "when we respond to rhythm as listeners or feel a rhythm as performers, we experience something vital and dynamic—a flow of energy through time, one might say. This flow is not uniform and undifferentiated, but is rather characterized by a dynamic interplay of ebb and flow, of intensification and relaxation".[137] This distinction is important since a pedagogy of rhythm grounded on an understanding of rhythm of a more abstract nature has the danger of leading to a mechanical execution of musical rhythm, while one that understands rhythm more dynamically helps students make the link between musical and physical gesture, so that the result in performance is more expressively rich. The crucial issue here is integrating into the idea of rhythm all musical dimensions, including pitch, dynamics, articulation, etc. so that one doesn't talk about different rhythmic aspects of musical structure separately.[138] In teaching *musical* performance, you don't first focus on metronomically correct rhythms and then attempt to give them life by adding expression. You rather learn how to read musical structure (whether that's durational or pitch or other kind of structure) gesturally right from the start; you train the students to "see the durations and pitches of a tune as inherently dynamic";[139] you train the students to see gestures in a way that "the processes of thinking and feeling" are integrated.[140]

The gestural language used by Graybill, which aims at unifying all rhythmic aspects of music, is not other than the one I used above with the forward- and backward-pointing arrows representing "anacrustic" and "metacrustic" gestures, pointing towards

[137] See Graybill, "Towards a pedagogy of gestural rhythm," p.1
[138] Recall the discussion on Rink's analytical approach in the previous chapter where the idea of the "intensity curve" was similarly integrative in its scope.
[139] Graybill, "Towards a pedagogy of gestural rhythm," p. 44.
[140] Ibid., p. 44.

and away from "accentual" or "gestural focal points".[141] The difference is that, as I used it above, its primary aim was that of describing harmonic function in relation to rhythm and metre, in contrast to Graybill, who chooses to stay away from the way tonal relationships interact with other structural aspects to shape gestural rhythm.[142] Graybill's main pedagogical concerns have to do with the way an overly metrical approach to rhythm prevents performance students from playing expressively. As he notes, "The difference between a metrical and gestural conception has considerable bearing on performance; a longer duration sounds very different when it is counted than when it is truly felt as a dynamic shape".[143] Partly due to our notational system, which is visually biased toward metrical units, and partly due to our long pedagogical tradition of teaching rhythm as counting against a regular metrical framework, mastering musical performance feels like a constant struggle to free oneself from the tyranny of the bar.[144] (Recall from chapter 1 how the same concern was expressed during Pires's masterclass.)

2.5 Metre opposed to rhythm

In theoretical terms, this struggle has been generally understood as the opposition between the concepts of metre and rhythm. On the one hand, we have metre, which is generally thought of as representing the regular, periodic, measured or lawful aspect of musical structure or experience while, on the other, rhythm (in the less inclusive sense of the word) represents the more irregular, fluid, free, spontaneous or expressive aspect of musical experience. Most theorists take this opposition or separation for granted, considering metre as having a more independent and autonomous status that comes prior

[141] As Graybill explains, these focal points correspond to Lerdahl and Jackendoff's (1983) *phenomenal accents,* which differ from metrical accents. The origin of Graybill's concepts is Jaques-Dalcroze's theory of rhythm, which classifies "beats as the *crusic*, seen as a release of energy; the *metacrusic* beat, seen as a gentle carryover or dying away; and the *anacrusic* beat, seen as a preparation of energy for release" (a description of Jaques-Dalcroze's theory of beat quality by Abramson (1986), quoted in Graybill's article, p.18). As Graybill points out, these gestural groups remind one of Cooper and Meyer's (1960) grouping categories, which are either beginning-accented, end-accented or middle-accented but also of Berry's (1976) initiative, reactive and anticipative impulses.

[142] Graybill, "Towards a pedagogy of gestural rhythm", p. 38. This basic arrow notation used by Graybill will be transformed into a more elaborate graphic representation language in chapters 3-5, where more details of expressive movement will be communicated.

[143] Ibid., p. 28.

[144] Even though several theorists have commented on this problem, (including Kurth, Schenker and Zuckerkandl) few have focused their attention on practical pedagogical issues and solutions.

to rhythm. Metre, or the chronometric aspect of time,[145] "provides the 'measure of time' for rhythmic activity—a temporal grid for the timing of musical events or a scaffolding for the construction of the genuinely rhythmic edifice of music. In this way, metre can be conceived as a more or less independent structure that rhythm uses for its own ends. Rhythm freely plays with or even against meter".[146] The meaning of rhythm—the patterns of durations that are phenomenally present in the music—is thus dependent on how they align with this metric framework. While this model of the interaction of metre and rhythm, has proved quite effective in capturing the intuition of the disturbance of the expected, regular, by the unexpected, irregular, aspect of rhythmic organisation, a number of complex issues relating to both various definitions of these concepts and the way they are graphically represented or understood makes the issue much more complex. If metre and rhythm are meant to interact, how exactly does this happen and what is the result of this interaction in experiential terms? To what extent does the idea of metre represent an experiential outcome or product (a regular experience of metric cycles of motion) rather than a psychological process (our inclination to expect regular rhythmic patterns)? Does the idea of metric structure occur in different degrees of regularity in different pieces or does it always occur the same way? Is metre really an aspect of rhythm as some theorists believe and what pedagogical consequences such an understanding may have? Below I attempt to throw some light on these issues starting first with the idea of metre.

Consider the highly influential definition of metre by Lerdahl and Jackendoff from their book *A Generative Theory of Tonal Music* (GTTM), where the idea of human expectation of regularity is expressed in terms of an idealised metrical structure. According to Lerdahl and Jackendoff, as expert listeners hear a piece of music, they are first confronted with a series of phenomenal accents, understood as all those events at the musical surface that give emphasis or stress to a moment in the musical flow. After processing these raw signals, they naturally organise them (through the process of grouping) into various kinds of groups (motives, themes, phrases, periods etc.) and, at the same time, out of these groups, they instinctively infer or extrapolate a regular pattern of strong and weak beats to which they relate the actual musical sounds.[147] Here we see that we start out with the irregular surface which results in various groupings we could call surface rhythms and then, an aspect of this rhythmic structure is isolated from

[145] The description of the metre-rhythm dichotomy in terms of the *chronometric,* as opposed to *integral* or experiential, aspects of time appears in Epstein, *Shaping Time*, p. 7.
[146] Hasty, *Meter as Rhythm*, p. 4.
[147] Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, pp. 12-18.

the rest as regular metre. Graphically, metre is represented by the dot notation shown in Figure 2.30 (a reproduction of their Example 2.12), which interacts with the grouping structure superimposed below. As the graphic representation suggests, and as Lerdahl and Jackendoff stress, "even though the two structures obviously interact, neither is intrinsically implicated in the other; that is, they are formally (and visually) separate."[148]This is because, as they note, these two structures are fundamentally very different in nature: the rhythmic structure consists of rhythmic groups organised hierarchically and metric structure consists of beats organised hierarchically; moreover, "groups do not receive metrical accent, and beats do not possess any inherent grouping."[149] This distinction appears to be very fundamental to how they understand metre and rhythm and one wonders how they can interact if they are fundamentally different in nature. Is the idea that these two structures are fundamentally different in nature only a symptom of the choice of the concepts and graphic representational symbols used or a real experiential phenomenon? Is metric structure, understood here as conceptually and experientially distinct from grouping structure, "intuitively straightforward" as they claim? Is there an aspect of our experience of music that corresponds to this regular succession of strong and weak beats?

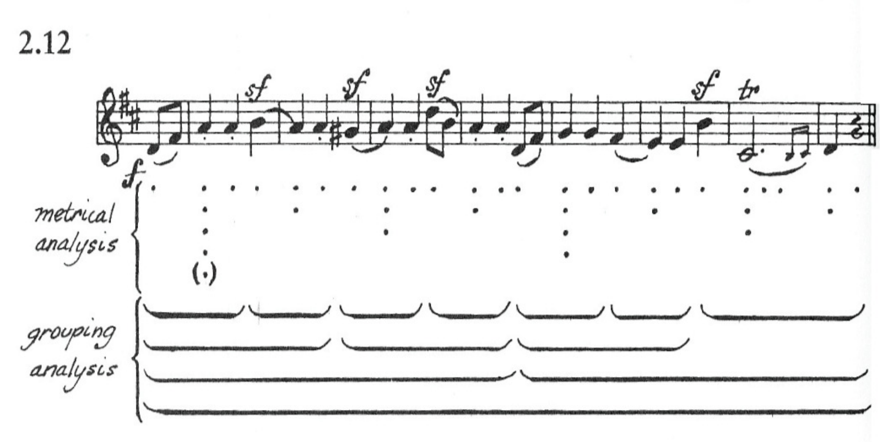

Figure 2.30 Reproduction of Lerdahl and Jackendoff's Example 2.12 from GTTM, showing the interaction of grouping and metric structures.

[148] Ibid., p. 26.
[149] Ibid., p. 26.

I will begin with the last question, whose answer appears to be positive. Despite the obvious weakness of the dot notation to convey metric experience effectively,[150] one can easily know which aspect of our experience it tries to capture. It was perhaps more effectively and explicitly described by Justin London as "a particular kind of a more general behavior…a musically particular form of entrainment or attunement, a synchronization of some aspect of our biological activity with regularly recurring events in the environment".[151] Combining elements from Large and Palmer's (2002) model of metric oscillations, which represents the modulation of the listener's attentional energy or expectancy (Figure 2.31), and Zuckerkandl's (1965) pattern of metric waves representing the continuous ebb and flow of virtual motion (Figure 2.32), London prefers the circular representation shown in Figure 2.33. In this way, accent does not appear to be a given but the result of a complex interaction of mutually reinforcing attentional (expectancy) cycles at different levels of structure. At the same time, accent is more effectively represented not as an isolated moment of emphasis but as part of a more dynamic, continuously moving metric system. Ultimately, this helps one conceptualise metric experience, in terms of (still largely implicitly) physical movement, the cyclical nature of everyday-life activities such as tapping, walking, dancing, breathing, and so on, which is directly related and influenced by expectation processes. In this sense, metre does not appear to be an abstract measurement of time, or an empty container of time awaiting to be filled in, but an actual experience of cycles of motion, a rhythmic experience of regularly recurring, equally weighted cycles of motion. Despite London's more dynamic representation of metric experience, it is nevertheless still conceived, like Lerdahl and Jackendoff's, as an essentially autonomous structure of regularly-spaced, equally-weighted cycles of motion. The question that continues to remain unanswered, however, is to what extent such an idealised structure has a psychological reality in relation to the act of listening to music. In other words, to what extent do we actually experience such a regular metric structure while listening to music?

[150] Christopher Hasty, for example, has criticised the discontinuous nature of the graphic representation for capturing an experience which is inherently continuous. See Hasty, *Meter as Rhythm*, particularly chapter 4.

[151] Justin London, *Hearing in Time*, p. 4.

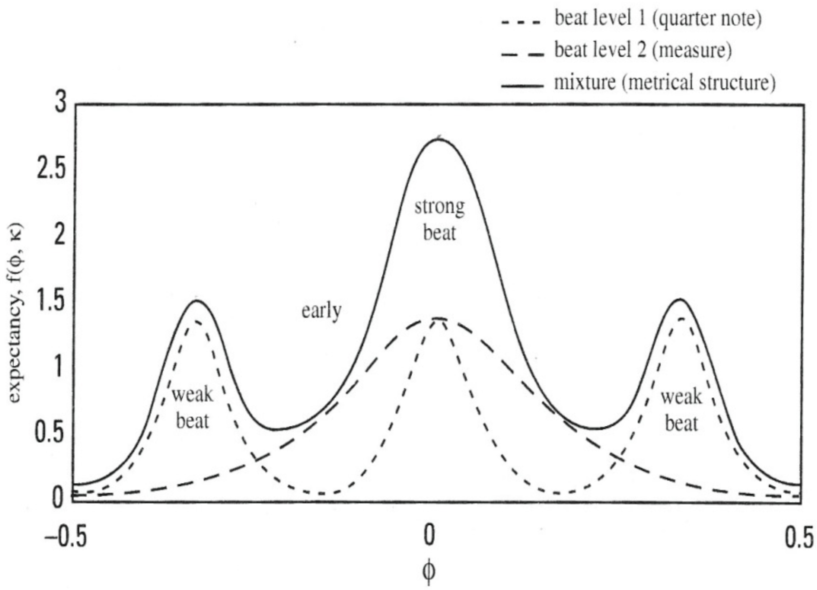

Figure 2.31 Reproduction of Figure 1.2 from London's *Hearing in Time* showing composite and component metric oscillations, after Large and Palmer (2002). Here one sees a complete cycle of a $\frac{3}{4}$ bar (solid line) with the downbeat positioned in the middle of the diagram.

Figure 2.32 Reproduction of Figure 4.4 from London's *Hearing in Time*. Metric "wave" analysis after Zuckerkandl (1956).

a)

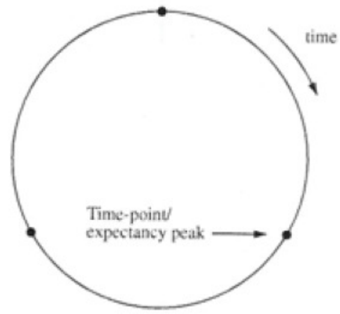

Figure 4.2. Basic 3-beat metric cycle.

b)

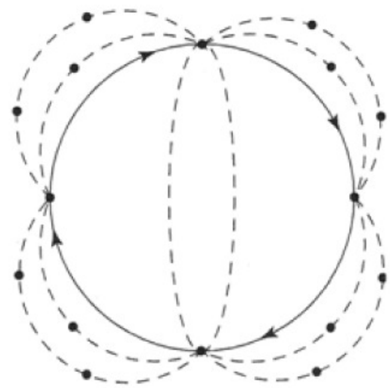

Figure 4.4. 4-beat metric cycle with various potential subdivision and half-measure levels.

Figure 2.33 Reproduction of Figures 4.2 and 4.4 from London's *Hearing in Time* showing a basic 3-beat metric cycle (a) and a four-beat metric cycle (b) with various potential subdivision and half-bar levels.

Synchronising our bodies and/or "attentional energies" to the regular aspect of rhythmic structure is one of the most fun and physically satisfying elements of musical experience.[152] In its most extreme and extroverted form, it is our innate inclination to dance to music, which, when expressed in a more reserved manner, it commonly takes the form of foot/hand tapping or head nodding. It is part of the process of making sense of music, perhaps the most basic one, which even the most inexperienced listener, will manage to unconsciously and effortlessly perform. While in certain social contexts, however, physically reacting (dancing) to the most apparent, basic aspect of the rhythmic structure of music is all that is expected, in certain other contexts, limiting oneself to

[152] For a comprehensive recent study on entrainment in relation to music see Clayton et al., "In Time with the music".

such a basic processing of music may in fact prevent one from appreciating the full complexity and meaning of music. Too much focus, in other words, on metre as regular cyclic motion will distract or even block one's view, in my experience, from the irregular and variegated rhythmic aspect of music. While the theoretical explanation of having the regular metric structure come into juxtaposition with the irregular rhythmic one to create expressive meaning may work well conceptually, it is practically (pedagogically) limiting. This applies to listeners and especially to performers, who can easily fall into the trap of playing too mechanically if such an idealised concept of metre becomes a guiding principle. If metre, on the other hand, is seen as only an aspect of rhythm, and the focus is on the particularity and irregularity of rhythm, then it's possible to do full justice to the meaning of music. This is not to say that performers or listeners should not have a sense of the regular pulse of the music, or even tap this pulse with their foot. This should be done, however, in a way that each pulse has its own unique weight as determined by the particular gestural context. In this way, these pulses no longer group in regular metric cycles of predictable and predefined weight and character, or successions of strong and weak beats, but can take a variety of other more complex and experientially meaningful relations.

In *Meter as Rhythm*, Christopher Hasty argues on similar lines, proposing a definition of metre as an integral part of rhythm along with graphic representation symbols for analysing the rhythmic structure of music. Graphic symbols are always crucial both in how we conceptualise and how we hear music. Despite the fact that Hasty's analytical method manages to integrate metre and rhythm quite well, its complex theoretical jargon and graphic system become an obstacle in becoming a practical tool of analysis. Though simpler and perhaps more suggestive, the symbols traditionally used for metric and grouping structures are problematic in their own way: what prevents them from integrating is not the experiential nature of metre and rhythm but the way the symbols used for their representation constrain their definition and conceptualisaion. Lerdahl and Jackendoff, in other words, are right to say that their dot and grouping structure cannot interact, except that the problem lies within the symbols themselves and not with the concepts they wish to describe. On the one hand we have the dot notation which uses discontinuous durationless points to represent something that is continuously flowing and dynamic. As seen above, however, these dots, even by implication, do manage to convey metric cycles of motion, which rather closely relate to our bodily experience of metric structure. On the other hand, we have grouping structure, which, even though it appears to be continuous, as any representation of music should be, is in fact unable to convey effectively a sense movement. Grouping structure is supposed to represent the perceived organisation of musical events into various groups at different hierarchical levels. For Lerdahl and Jackendoff, the process of grouping musical events in time is analogous to that of grouping objects in space. Borrowing principles from Gestalt psychology, they treat musical events as if they were static objects in space. In Figure 2.34a, for example, the first three musical events are said to be part of the same group. The principle at work is that of proximity, which, when transferred to temporal perception, treats time spatially in order to help one "hear" events as belonging to the same group due to their relative distance. Similarly, at Figure 2.34b, musical events are conceptualised as belonging to groups based on their similar content. To what extent, however, can our rhythmic experience of music be described in terms of hearing musical events as belonging to the same or different group? Unlike visual perception, experiencing music in time never involves perceiving more than a single moment at a time. As Hasty would put it, music experienced in time never appears in front of us fully formed as if it is an object awaiting our inspection, but as a constantly changing "now", a present awareness of an event's becoming.[153] While it is true that we do conceptualise musical events as forming motives, phrases, periods, sections etc., such conceptualisations are only abstractions of an aspect of our experience that involves much more than mere grouping boundaries.

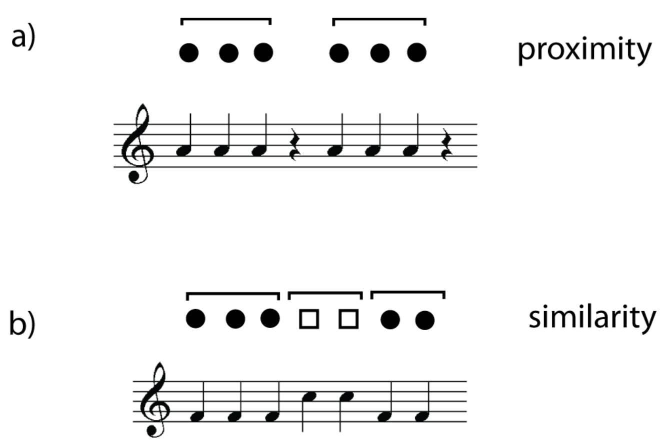

Figure 2.34 Gestalt grouping principles of a) proximity and b) similarity applied to musical perception.

[153] Hasty, *Meter as Rhythm*, pp. 67-83.

What we have therefore here are two graphic representations that describe two things of a very different nature: the one conveys movement process (even if largely implicitly) and the other conveys a rather abstract way of conceptualising musical events as belonging to static groups. When one attempts to integrate them, obvious symptoms arise. This is seen most characteristically in Cooper and Meyer's approach to rhythm where, even though they do make a distinction between metre and rhythm, in practice, they do integrate them. According to Cooper and Meyer, "rhythm may be defined as the way in which one or more unaccented beats are grouped in relation to an accented one."[154] (See Figure 2.35 reproducing their Example 140.) Thus, as their analytical symbols demonstrate, patterns of strong and weak beats represented by symbols used in poetic scansion are given meaning by the grouping structure represented by brackets below. The one cannot have meaning without the other and the two together combine elements of both metre and rhythm in a rather flexible way. While effective in many ways, this approach is not without its problems, as different theorist have noted. According to Lester, the problem lies in "the failure to differentiate between poetic accent and musical accent":[155] "The difference between poetic and musical accent is the difference between considering accent a property of a span of time or a property of a point in time. Whereas poetic accent refers to a span of time, musical accent is the property of a point in time."[156] It thus appears inadequate to use the idea of accent to describe whole time spans of different sizes as strong or weak, as Cooper and Meyer do.

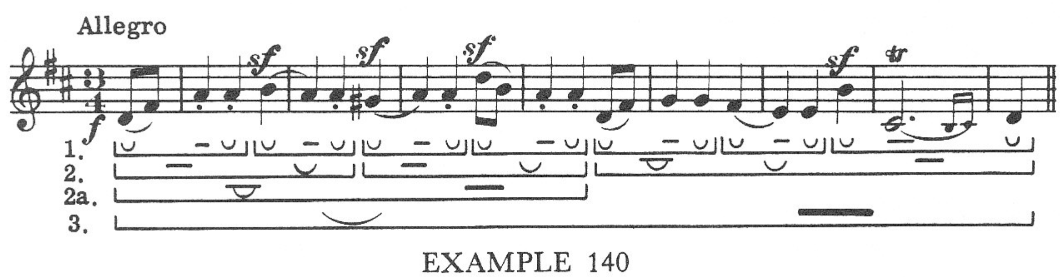

Figure 2.35 Reproduction of Cooper and Meyer's Example 140 from the *Rhythmic Structure of Music.*

Despite the obvious problems that the interaction between Cooper and Meyer's graphic symbols causes, however, their overall analytical system does manage to convey

[154] Cooper and Meyer, *The Rhythmic Structure of Music*, p. 6.
[155] Lester, *The Rhythms of Tonal Music*, p. 14.
[156] Ibid., p. 15.

gestural process. But again here, as was the case with the dot notation, this is not conveyed explicitly enough. In Figure 2.36, I attempt to make this more explicit by showing how the arrow notation I used above to describe gestural process maps onto Cooper Meyer's graphic notation. At 2.36a, I show how duple and triple metres can be conveyed by both systems. At 2.36b, I show how their five basic rhythmic groups (iamb, anapest, trochee, dactyl and amphibrach) can be understood as gestures. In this way, the focal point of each pattern (the strong accent) no longer refers to a whole time span but only to the (durationless) goal moment of either Metacrusis or Anacrusis. The time span itself, or the duration between two strong accents as goal moments, is described by the processes of Anacrusis and Metacrusis.

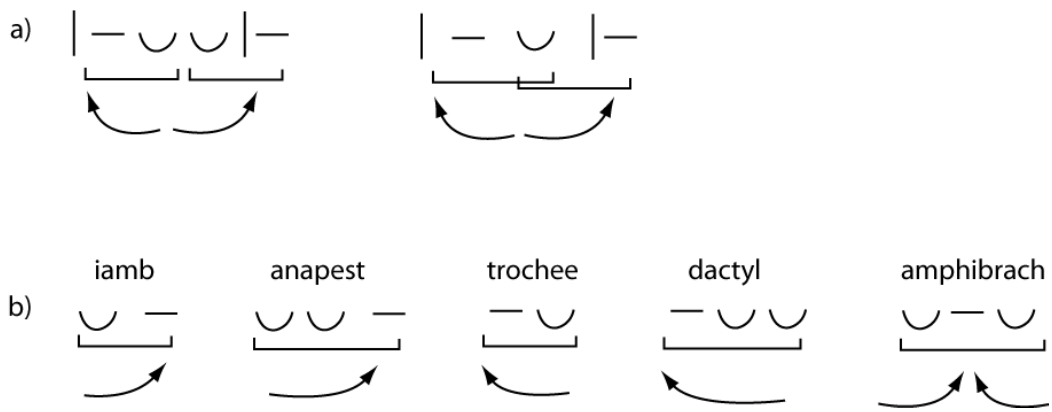

Figure 2.36 a) Gestural content of triple and duple metric cycles; b) gestural content of Cooper and Meyer's five basic rhythmic patterns.

Grouping structure is not only problematic in its resistance to integrate with metric structure. A number of other pedagogical concerns are involved. Consider, for example, the theme I have already discussed from Mozart's A major piano sonata. Figure 2.37a reproduces Lerdahl and Jackendoff's Example 3.33, showing two possible groupings of the music. As they note, "the musical surface is in conflict between these two groupings."[157] This conflict is explained in terms of the choice that performers have between two interpretations: in theoretical terms, this is about deciding (although, as they emphasize, largely unconsciously) whether to place a break in the continuity of line, based on either the "local detail rule" that speaks for a break after the long quarter note duration on beat 2 of the first bar (grouping b), or the "maximal motivic parallelism rule" that favours grouping a. At a more conscious level of thought, when this grouping

[157] Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, p. 63.

ambiguity inherent in the structure of the notes is confronted by performers, they need to decide whether to project, through the appropriate performance interventions, phrase grouping a or b:

> A performer wishing to emphasize grouping a will sustain the quarter note all the way to the eighth and will shorten the eighth and diminish its volume. He thereby creates the most prominent break and change in dynamics at the bar line, enhancing the effects of GPRs 2 and 3 there. On the other hand, a performer who wishes to emphasize grouping b will shorten the quarter, leaving a slight pause after it, and sustain the eighth up to the next note. The effect of GPRs 2 and 3 is then relatively greater before the eighth and less after it.[158]

Figure 2.37 a) Reproduction of Lerdahl and Jackendoff's example 3.33 from GTTM showing two possible groupings of the opening of Mozart's theme of the A major piano sonata, K.331. b) and c) showing two alternative gestural analyses of the Mozart excerpt.

While this kind of explanation sounds quite plausible—one can indeed imagine performers going through such decision making processes, especially while preparing, rather than during, a performance—it nevertheless promotes a kind of understanding and conceptualisation of musical phrasing that could have undesirable pedagogical results relating to the actual act of performance. I am specifically concerned about whether this kind of conceptualisation of grouping structure, which is borrowed from visual perception, can apply to the more dynamic and integrative way performers shape music during performance.[159] Do we hear breaks in the musical flow the same way we visualize

[158] Ibid., p. 63.
[159] In the GTTM, this borrowing is fundamental in the way musical structure is explained. As Lerdahl and Jackendoff note, "From a psychological point of view, grouping of a musical surface is an auditory analog

breaks in space? To what extent do such grouping structures, emptied from their musical content and understood as mere grouping boundaries, have meaning in isolation from other aspects of music involving accentual structures or dynamic processes? In what ways could such conceptualisations interfere with a *musical* performance?

A performer, for example, trained to think in terms of static group boundaries,[160] may get distracted from the continuously flowing and dynamically shaped character of music. While grouping of musical notes as if they are objects in space may *look* appropriate on the musical score, it *sounds* inadequate when considering the proper nature of musical experience. Ideally, grouping structure would be effectively integrated with other more dynamic aspects of music. When this is achieved, grouping takes the meaning of gestural process where duration (or group) is understood as directed motion and group boundaries are important turning points between differently charged gestural processes. The break of the second grouping option of Figure 2.37a, for example, can better be understood as the moment where the strength of an opening Metacrusis has faded out in order to give way to a gradually emerging Anacrusis that will give forward moving character to the last quaver of the bar (Figure 2.37b). An alternative interpretation is shown at c, where the focus is not grouping boundaries but goal moments. Dynamically experienced, choosing between these different interpretations does not involve deciding where to place breaks, as Lerdahl and Jackendoff's model suggests, but choosing how much and where to drive the rhythmic energy towards or away from. While the idea of phrase breaks can be thought of as corresponding to little micro-level silences, or cessations of physical contact with the instrument, a conceptual reinforcement of these phenomena divorced from their more dynamic, gestural context could result in an unmusical phrasing: encouraged by the concept of "break", the performed effect could similarly be that of a literal, and unmusical, break of the gestural flow of the music.

The connection between abstract grouping structures and gestural process is not obvious to everyone and that's why pedagogically such abstractions can be potentially distracting or even harmful since they can cultivate a more static and fragmentary understanding of music. When performers play music, they process all structural aspects at the same time while shaping a continuous and integrated musical line. The same applies to listeners who are interested in experiencing the total music effect rather than

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of the partitioning of the visual field into objects, parts of objects, and parts of parts of objects". See Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, p.36.

[160] Conceptualisation of phrases in terms of group boundaries is not only used by theorists but also by instrumental teachers.

focusing on specific isolated structural aspects. As explained here, grouping, recast as gestural or rhythmic process, integrates also the idea of musical accent, here understood and defined more generally and inclusively as focal moments of rhythmic gestures. The nature of this accent is not unlike that of metrical accents, which can also be understood gesturally as beginnings of metrical (or gestural) cycles. In agreement with Hasty, metre is thus considered as an aspect of rhythm, and thus no distinction is made between metric and rhythmic accents. This is unlike the well-established traditional distinction between metric and rhythmic accents, which corresponds to the metre-rhythm dichotomy. According to this distinction, metrical accents, being the product of the listener's active engagement with the regular, metric aspect of music,[161] occur in pairs of strong and weak beats. Rhythmic accents, on the other hand, are understood more as isolated moments of emphasis caused by various phenomenal aspects of the musical surface.[162] Being relational concepts (as part of cycles of strong and weak beats), the first are understood more dynamically (even if largely by implication, as I explained earlier) and the second more statically (in the sense that they are not defined in relation to dynamic processes). The first are understood in terms of bodily behaviour such as foot tapping, and the second in terms of the abstract cause of a local emphasis. Again here, in the understanding of different kinds of accents, we see the problem of mixing continuous and discontinuous structural concepts.[163]

The correspondence between rhythmic accents and grouping structure is rather obvious. One of the most common ways groups can be articulated is through a sudden change in some parametric value, which causes a phenomenal accent right at the beginning of this group: from short to long notes, from silence to sound, some relatively big melodic leap, harmonic changes etc. Depending on the structural factor involved, such phenomenal accents are given different names: durational or agogic, tonal or harmonic, textural, dynamic, registral etc.[164] While conceptually unambiguous, this understanding of accent cannot easily relate to one's experience of music. Defined solely in terms of their abstract structural cause they cannot effectively suggest their connection to dynamic experience. In attempting to integrate all of these different kinds of accents into a single experienced structure, one wonders how to "add up" their experienced

[161] See London, "Rhythm", p. 278.
[162] See Lerdahl and Jeckendoff's representative definition of phenomenal accent in *A Generative Theory of Tonal Music*, p. 17.
[163] Hasty discusses in great detail this idea of continuous vs discontinuous structural representations of rhythm and meter in his book *Meter as Rhythm*.
[164] For a detailed discussion of different kinds of phenomenal accents see Lester, *The Rhythms of Tonal Music,* chapter 2. See also Clarke, "Generative principles".

effect. How does the idea of three different kinds of accent referring to a single moment—for example, a metric, an agogic and a tonal one—make sense as a unified musical experience? To what extent are such distinctions meaningful to a performer or a listener as isolated emphases? How does one make the connection between accent and dynamic process?[165]

2.6 Integrating musical structures

One of the most problematic and challenging tasks of music theory is how to understand the interaction between the various structural components theorised independently, and their contribution to the total musical experience. As suggested here at different occasions, the main obstacle lies in the fact that each structure is conceptualised in a different way, using different languages for communicating the meaning of various structural components. And while for most theorists it is acceptable and meaningful to break down and talk about the function of isolated structural components, for most performers or listeners this can often be distracting. While music theory is obsessed with analysis (that is, with breaking musical structure down to its components), music performance involves a strictly synthesising process: how to play the notes of a piece in a way that all of its structural aspects are integrated harmoniously. And in performance, unlike music theory, this synthesising process has to be done automatically during performance. Focusing on the effect of the total musical structure is very important for listeners too, if maximal understanding and enjoyment should take place. Music theorists on the other hand, have the luxury to take their time and process various structural components in all possible ways.

Synthesising analytical results in music theory is not uncommon. But when one proceeds with analysis without having in mind synthesis as the ultimate goal, the analytical results will in most cases resist any subsequent integration. Figure 38 shows a

[165] This tradition of considering different kinds of accents independently can be traced back to Kirnberger's work, or what has been later characterised and criticised by Riemann as the *Akzenttheorie.* See Caplin, "Theories of musical rhythm in the eighteenth and nineteenth centuries". Caplin shares the same concern with me about the experiential reality of these different accents: "Left undiscussed by Kirnberger is the question of how these different accents actually exist together—both in performance and experientially—and even how to formulate a coherent theory of multiple accentuations"(p.670). According to Caplin, Hauptmann was the first to propose a truly unified theory of accent, conceived in terms of one fundamental principle: "no accent can be an isolated determination, nor occur in a single portion of time as a solitary element not standing in an arrangement of accents and not in a reciprocal relation with all the other parts of time in a metrical unity. Each single accent is always rooted in the metrical system" (from Hauptmann, *Harmony and Metre*, quoted in Caplin, p.681-82). With Riemann the pulse/accent theory of the previous century begins to give way to a more dynamic model, where speaking of accents is avoided in favour of directed motion toward goal moments. (See Caplin, p. 683-91.)

typical example, taken from Carl Schachter's article "Rhythm and Linear Analysis: A Preliminary Study", where the analytical results are simply juxtaposed together with the goal of providing the reader with an idea of how they interact or combine together.[166] The focus here is how tonal and durational rhythm "interact" with each other and with metre. The way each structure is conceptualised, however, which is directly controlled by the graphic representation used, limits any insights about their interaction to a mere visual comparison of how the local emphases or groups of each structure vertically align with (conflicting or reinforcing) each other. Similar in approach are Harald Krebs's analyses of metrical dissonance, whose focus is again the conflict between two or more visually and conceptually distinct structures (Figure 39): the rhythmic structure of the excerpt is conceptualised in terms of two regular metrical structures out of phase with each other. This, however, says nothing, at least in any explicit way, about how these two structures integrate into a single dynamic process.

[166] See Carl Schachter, "Rhythm and linear analysis: A preliminary study", p. 44.

Figure 2.38 Reproduction of Carl Schachter's Example 1.17 from "Rhythm and linear analysis: A preliminary study".

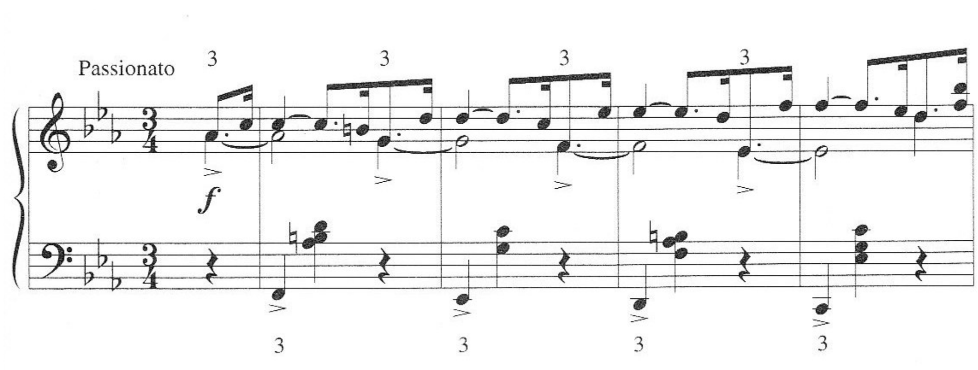

Figure 2.39 Reproduction of Krebs's Example 2.10 from *Fantasy Pieces* showing metrical dissonance in "Chiarina" from Schumann's Carnaval, bars 1-4.

In GTTM, the consideration of the interaction of the various musical structures, which are first elaborated in great detail in isolation, becomes a more explicit and ambitious goal. With the aim of presenting a systematic theory of perception of music—“a formal description of the musical intuitions of a listener who is experienced in a musical idiom”—Lerdahl and Jackendoff propose “four types of hierarchical structure *simultaneously* associated with a musical surface”[167] (emphasis mine). The way each of these four structures integrate with each other is shown in Figure 40: “From the grouping and metrical structures the listener forms the time-span segmentation over which the dominating-subordinating relationships of time-span reduction take place; and from the time-span reduction the listener projects the tensing-relaxing hierarchy of prolongational reduction.”[168] Close study of the way these four structures are defined and related to each other raises a number of questions as to their exact nature in relation to experience. One is not sure whether these structures represent four interacting but independent structures with distinct psychological reality or whether they represent abstract theoretical stages made up by the authors in their attempt to find a way to describe our overall musical experience in the most complete and accurate way.[169]

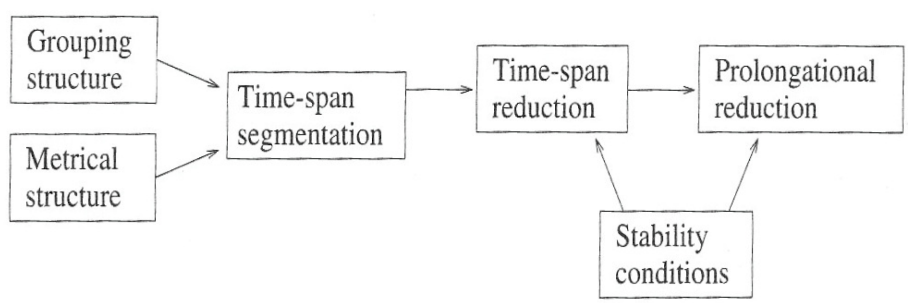

Figure 2.40 Reproduction of Figure 1.2 from *Tonal Pitch Space* by Fred Lerdahl: A flow chart of GTTM’s components.

When the interaction of grouping and metric structures is undertaken by the authors, an important change in the way they understand their function takes place: while they still hold on to their original definition of beat and group according to which

[167] Lerdahl, *Tonal Pitch Space*, p. 3.
[168] Ibid., p. 4.
[169] For more about the multiple epistemological registers in GTTM see Cook, “Epistemologies of music theory”.

"neither is intrinsically implicated in the other"—i.e. groups do not receive any metrical accent, and beats do not posses any inherent grouping"[170]—they now essentially treat them as closely implicated between them. Their focus now is how beats group among them, drawing the distinction between "upbeats" and "afterbeats".[171] They even translate metrical structure into a kind of grouping structure they call "time-span segmentation", which allows grouping and metre to be compared on equal grounds so that their interaction can be studied: since the two will not always be in phase with each other, distinctions are made based on whether durations relate to the previous or following strong beat. Thus, the F♯ on the last beat of bar 12 in Beethoven's theme in Figure 2.41, for example, "belongs as an anacrusis to the succeeding phrase" due to its grouping boundary at that moment, which causes the weak beat to function as an upbeat with the immediately following strong beat.[172] What we see here is an attempt to integrate the ideas of metrical beat or accent with grouping in a way that both are understood more dynamically as gestural rhythm. Though only anacrusis is invoked here, one can easily see how "afterbeat", similarly, corresponds to the more dynamic concept of Metacrusis.

While these ideas of upbeat and afterbeat or Anacrusis and Metacrusis are very essential to how metric and grouping structures interact, the graphic representation of the interacting components appears to be an obstacle in effectively conveying the outcome of this interaction: the graphic system, which is so heavily "biased" in favour of the separate components, can only convey the interacting outcome, which is arguably more important, by implication rather than explicitly. One even wonders to what extent such an idealized definition of these separated components was necessary, perceptually valid or pedagogically useful. Why define them independent of each other since in reality they will always interact? What's the psychological reality of a beat that does not group one way or the other?

[170] Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, p. 26.
[171] Ibid., especially pp. 28-30 and 127-133.
[172] Ibid., p. 126.

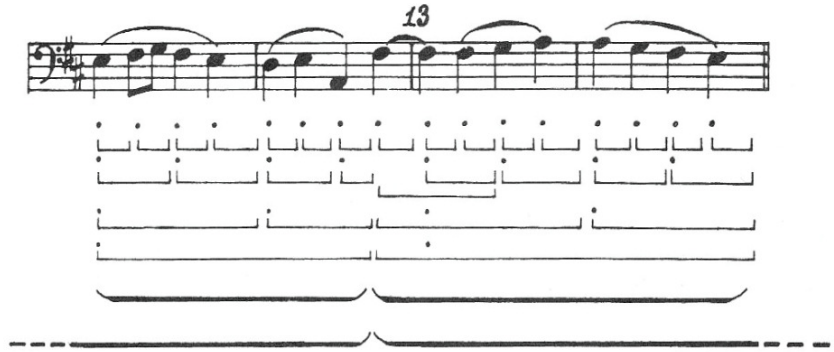

Figure 2.41 Reproduction of Example 6.4 from the GTTM: time-span segmentation of excerpt of the finale theme of Beethoven's ninth Symphony.

Apart from a rather tangential reference, the idea of Anacrusis or dynamic process is not developed any further by the authors of GTTM and does not become integral to their theoretical or graphic system.[173] Rather than use the idea of dynamic process as the unifying element between different structures of music, as I suggested above, when they later attempt to capture intuitions about pitch stability, they introduce a new theoretical idea that will make structural integration even more difficult. Borrowing the concept of structural importance from Schenkerian theory, they set about describing a stricter and more specific hierarchy of pitch stability. This is done through the "tree notation", which they consider much more efficient and unambiguous than Schenkerian notation. It is, nevertheless, still inefficient in an important way: like Schenkerian analytical notation, tree notation by itself cannot convey important rhythmic-metric information. This is particularly problematic for GTTM, considering the importance it gives to rhythmic criteria for structural importance. Unlike Schenkerian theory, which leaves the analyst relatively free to consider rhythmic intuitions more informally and unsystematically, the goal of GTTM is to provide explicit rules, reflecting "a proper integration of criteria of pitch stability with rhythmic criteria based on the grouping and metrical components".[174]

Figure 2.42 shows how this integration of pitch stability and rhythmic criteria is graphically represented in GTTM. By juxtaposing the tree notation with the dot and time span segmentation (the outcome of both grouping and metric structures), these four paradigmatic situations distinguish between two kinds of left and two kinds of right

[173] This is typical of most theories of music, which even though they might make occasional reference to dynamic processes such as anacrusis, their emphasis is generally on more abstract structural patterns and relations.
[174] Ibid., p. 119.

branchings. What it essentially says is that it's not enough to describe an event as less stable (as is the second event y of a right branching, or the first x of a left branching) than another: one needs to specify their relative metric position. While this is a good step at integrating rhythmic and pitch structures, the notation does not appear to be very efficient in capturing the experienced effect it reflects. One is confronted here with a classic example of an apples and oranges situation, where the "taste" of their mixed result, although possible, cannot be readily imagined. To help the reader understand the meaning of these four paradigmatic situations, Lerdahl and Jackendoff describe their effect in terms of familiar concepts: "in a, event y on the afterbeat is the less stable event, as in the case of a passing or neighbouring tone or chord; in b, event x on the downbeat is the less stable event, as in the case of a suspension or an appoggiatura tone or chord. Cases c and d pertain to upbeats; in c, event x on the upbeat is the less stable event; in d, event y on the downbeat is the less stable event".[175] Even though such descriptions do help one, in some ways, to understand their combined effect, they nevertheless limit (by referring back to abstract conceptualisations of note structures) their ability to help one relate them to the more immediate and intuitive aspect of musical experience.

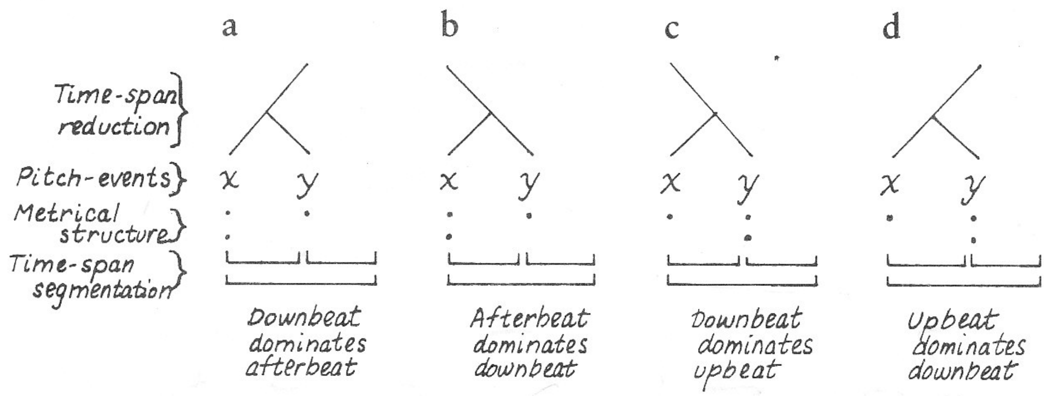

Figure 2.42 Reproduction of Example 6.7 from GTTM showing four paradigmatic situations resulting from the interaction of time-span reduction, metrical structure and time-span segmentation.

Although their time-span reduction which combined three structures together was able to convey quite some detail in the way we hear music, there is still one component that is missing. As they admit, what time-span reduction says is that "particular pitch events are heard in relation to a particular beat, within a particular group, but it says

[175] Ibid., p. 129.

nothing about how music flows across these segments."[176] A new kind of structure is thus introduced—the prolongational reduction (see Figure 2.43)—, which describes "tension and relaxation", the way music progresses from points of relative tension and repose. As they note, by viewing prolongational reduction in this way, they "are dealing not only with pitch reduction but with an essential aspect of musical rhythm, for tension and relaxation are rhythmic properties."[177] Nevertheless, as the nature of the graphic representation used for this structure shows, it cannot convey how the idea of tension and release does relate to rhythm. Its graphic representation, which is not other than the one used for time-span reduction, is not only presented in an arrhythmic context but it is also kept separate from the other structures. Does one, however, experience tension and release in music apart from other aspects of musical experience which have a similarly bodily basis? Can tension and release be separated from the kinds of rhythmic, metric, gestural processes we explored above? And most importantly, are intuitions of tension and release experienced the way suggested by prolongational structure, as successive phases of increase and decrease of tension?

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[176] Ibid., p. 122.
[177] Ibid., p. 179.

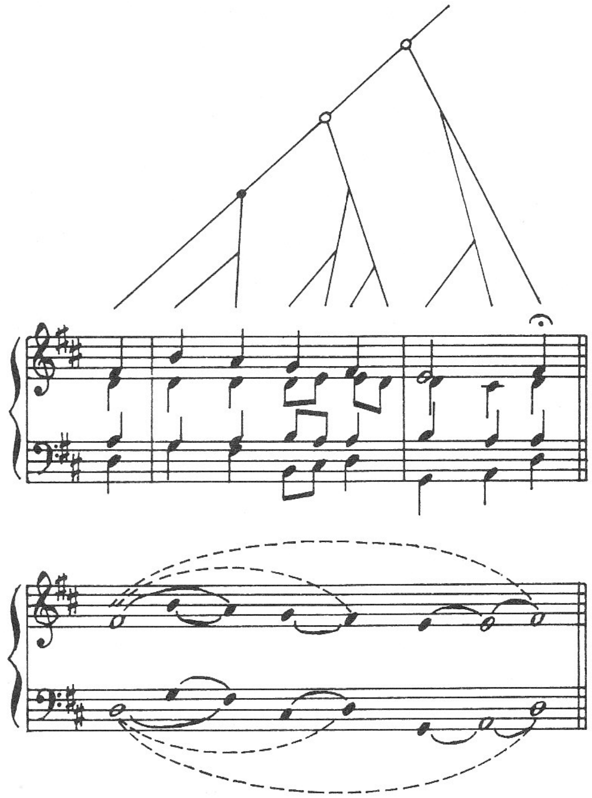

Figure 2.43 Reproduction of Example 8.31a from GTTM showing a prolongational reduction of the first phrase of “O Haupt”.

The idea of tension and release has been discussed by many theorists including Schenker, Riemann, Kurth, Sessions, Hindemith, Berry, Zuckerkandl, Schachter to name only a few, but it was only after Lerdahl and Jackendoff’s theoretical model that a more systematic study took place. Despite its shortcomings, this model, developed further by Lerdahl in more recent years,[178] nevertheless provided a systematic way of predicting the experience of tension values in music. A series of experiments that followed aimed at discovering how well this model could predict the experience of tension and release.[179] In all of these experiments, however, the focus was mostly tonal tension, tension coming from melodic and harmonic aspects of musical structure as opposed to all structural aspects. Moreover, for what I am here interested the most in, no adequate model of understanding the nature of the experience of tension and release, as opposed to its structural causes, was developed further. To me, such a model would include most of all, a graphic representation that effectively captures the nature of this experience, which

[178] See Lerdahl, “Calculating tonal tension” and *Tonal Pitch Space*.
[179] See Krumhansl, “A Perceptual analysis of Mozart’s Piano Sonata K.282”, Bigand and Parncutt, “Perception of musical tension in short chord sequences” and “Perception of musical tension in long chord sequences” and Lerdahl and Krumhansl, “Modelling tonal tension”.

goes beyond a mere experiencing of increase and decrease of tension, as it's usually represented. In "Modeling Tonal Tension", for example, Lerdahl and Krumhansl represent the experimental results of measuring tonal tension in comparison with the values predicted by Lerdahl's *Tonal Pitch Space* analysis in a simple increase/decrease dimension as shown in Figure 2.44. This does not match their discussion about the nature of the experience of tension, which, as different theoretical studies have also suggested in the past, is more complex than that. As they note, their model also develops an attraction component, which can be seen as a kind of tension, the intuition that melodic or voice-leading pitches tend toward other pitches in greater or lesser degrees (such as the leading tone to the tonic relation). It's a kind of tension, in other words, different from sequential tension in that it is more goal directed. This is not unlike the tension of expectation discussed by different theorists in relation to tonal theory and the one I discussed above in relation to rhythmic, metric and gestural experience. [180]

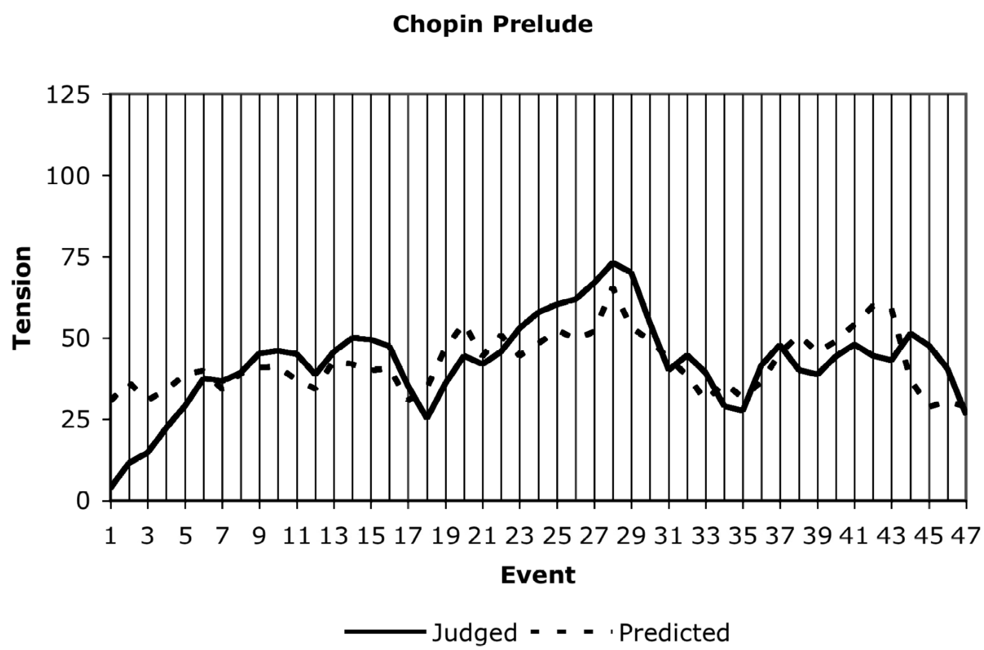

Figure 2.44 Reproduction of Figure 32 from Lerdahl and Krumhansl's "Modeling Tonal Tension," showing how well prediction of tonal tension using Tonal Pitch Space analysis

[180] For theoretical work related to the idea of tonal "attraction" see Bharucha, "Anchoring effects in music", Larson, "Musical forces and melodic expectations", Larson and Vanhandel, "Measuring musical forces", Margulis, "A model of melodic expectation", Meyer, *Emotion and Meaning in Music*, and Narmour, *The Analysis and Cognition of Basic Melodic Structures.*

matches that of experimental measurements. (The correlation happens to be rather weak.)[181]

To sum up, my point here is that the idea of tension and release is an aspect of musical experience closely linked to all aspects of musical structure, and would therefore be problematic in different ways to theorize and conceptualize it as a separate musical structure. This is in fact my argument about theorising musical structure in general, especially when our goal is to capture the nature of our total musical experience: if we agree that tension and release is linked to bodily experience and that in turn relates to rhythm, as well as meter, tonal structure and other aspects of structure, then it would be advisable to provide a model that integrates all of these components. This is particularly important when our goal is the creation of analytical methods that are used not only for their explanatory value but especially for helping student-analysts deeply engage with and explore the meaning of music. It is, therefore, with these thoughts in mind that I proceed in the following chapters to propose a more integrative model of understanding musical structure. As I already emphasised throughout this chapter, crucial in achieving this goal is above all the development of a graphic representation language that is not only based on an integrative theoretical model but is also visually suggestive enough that it can provide an effective link between abstract musical structure and real-time experience of musical sound through the whole body.

[181] See Lerdahl and Krumhansl, “Modeling tonal tension,” p.348.

CHAPTER 3

Music Analysis through Movement

3.1 Musical expression as movement

Even though the relation between expression and movement has been researched quite a lot for about two centuries, more needs to be done before music theory and analysis take full advantage of the importance of embodied research on performance expression. As I tried to show in the previous chapter, traditional music theory and analysis, which dominates music schools today, is slow at integrating such research within its teaching curricula, so that the more theoretical/experimental/philosophical nature of embodied research takes a more practical or pedagogical orientation. My goal, therefore, in this chapter is to continue to theorise the relationship between expression and movement with the ultimate goal of proposing specific analytical representation languages that can be used by whoever wishes to explore the embodied meaning of expressive movement.

The process of bringing together research on the body and mind as well of traditional theory and research on performance expression began in the 19th century. As Dogantan observed, even though the historical roots of contemporary research on expressive performance are normally located in the pioneering empirical work of Carl Seashore, "the theoretical foundations of these studies as well as the first establishment of the connections between bodily phenomena and expressive music performance go back to the 19th century".[182] Crucial among these studies was "the rise of scientific psychology from within the experimental physiology of the period", something that "gave 19th century theories concerning the workings of the human mind a decisively *embodied* character".[183] Key discovery during this time was the functioning of the "sixth sense" or "kinesthesis", which led to a series of experimental research that attempted to understand the origins of various theoretical models of rhythm. The work of R.H. Stetson was particularly important with regard to this, who explained rhythmic phenomena in terms of tensing and relaxing phases of different muscle sets in the body. At the same time, Lussy's theorising of rhythm in relation to performance expression and the bodily movements associated with this opened up new possibilities for the study of expressive

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[182] See Doğantan, "The body behind music", p. 452.
[183] Ibid., p. 449.

performance as well as for the pedagogy of music theory and performance. This last direction, which can be seen most characteristically in the work of Dalcroze is especially relevant to my work here, which has an explicit practical or pedagogical goal.[184]

While this more practical, pedagogical direction has continued to influence some research work in the twentieth century, it has largely been dominated by work of a more general theoretical, philosophical or psychological nature. Nevertheless, this work, whose preoccupation with the dynamic aspects of music has come to be known as the school of "energetic" thought, provides a solid background for a future rebirth of a more embodied as well as more practically-, pedagogically- and performance- oriented music theory. The emphasis in the twentieth century on music analysis—even if, as I pointed out in the previous chapter, it tends to lie more on the abstract side of theorising—can be seen as one step closer to a more practical orientation within the field of music theory. Schenker's preoccupation with life forces and motion, as well as with performance matters, is one such highly influential example within the energeticist school of thought. So was the analytically-driven work of other theorists such as Ernst Kurth, Arnold Schering, Hans Mersmann, Kurt Westphal, Victor Zuckerkandl and Wallace Berry.[185]

In parallel to this, also very important was the work of the early Gestalt theorists Ernst Mach and Christian von Ehrenfels, whose idea of "amodal" perception, later developed further by theorists such as Susanne Langer and Daniel Stern, made possible the conceptualisation of musical experience and expressive meaning in terms of physical movement in space-time.[186] Stern's notion of "vitality", those global, felt qualities of musical experience that emerge from our encounter with dynamic events, is especially relevant to my work here, which has a similarly integrative aim.[187] Stern's concern is how we understand the relation between the fragmented way the sciences have understood human experience and our familiar, everyday holistic experience of the world: vitality attempts, thus, to integrate the separate different sensory modalities (vision, audition, touch, etc) into the global emergent property or gestalt, which gives meaning to our lives. Very important in the idea of vitality is the act of movement—"our most primitive and fundamental experience"[188]—and its "four daughters": force, time, space and directionality. "We move all the time," Stern notes, "both physically and

[184] In the fifth chapter of *Mathis Lussy*, Dogantan talks about this early experimental research in physiology and psychology in more detail, as well as about how it led to more recent developments in the study of rhythm and expression.
[185] See Rothfarb, "Energetics".
[186] See Doğantan, "The body behind the mind", p. 453-55.
[187] Daniel Stern's most recent ideas on "vitality"can be found in his book *Forms of Vitality*.
[188] Stern, *Forms of Vitality,* p. 19.

mentally".[189] What makes us feel alive and vital is this constant process of change (whether visible from the outside or not) that goes on in both our body and mind. The meaning of every human experience, therefore, relates to, and derives its meaning from, some kind of movement, which has a distinct vitality contour feeling.

This vitality feeling is what interests me here as well, as it relates to our experience of music: the power of music "to move us by the expressions of vitality that resonate in us"[190] and give rise to what Susanne Langer referred to as "forms of feelings". "The word 'feeling'", expressed by music but also by any work of art in general, as Susanne Langer explained, "must be taken here in its broadest sense, meaning *everything that can be felt,* from physical sensation, pain and comfort, excitement and repose, to the most complex emotions, intellectual tensions, or the steady feeling-tones of a conscious human life",[191] and which defines its expressive form. "In any musical work, for example, there is a structure and pattern of temporal flow, pitch contours, and intensity (loudness/softness) that is analogous to felt patterns of the flow of human life".[192] "When we are actively listening to music, we imaginatively enter into its 'motion', experiencing all of the ways it moves, swells, hops, rushes, floats, trips along, drags, soars, and falls. This *musical* soaring, floating, or falling is experienced by us as *our felt flow* of experience. We feel it in our vital, tactile-kinesthetic bodies. When the music builds up tension (for example, as it moves from the lower through the middle to a high range), *we* experience that tension *in ourselves*. If we didn't, music would never move us".[193]

My understanding of musical expression here will similarly focus on this global, cross-modal vitality feeling, which is experienced as movement (physical or mental) in our bodies. My aim will be to find ways to capture and talk about this feeling of musical expression or what I will from now on refer to as expressive movement or musical movement. My focus on the experience of the dynamic, moving qualities of music can be explained by the fact that this expressive, vitality feeling is located in the moving body and the constant feeling of change and movement. The idea of musical movement is so central that the way we talk about music is largely through metaphors of movement: "we understand music as *moving*, and we understand ourselves as *being moved* by music."[194] Mark Johnson has codified these two ways we understand and experience

[189] Ibid., p. 9.
[190] Ibid., p. 4.
[191] Langer, *Problems of Art*, p. 15.
[192] Johnson, *The Meaning of the Body*, p. 238.
[193] Ibid,. p. 239
[194] Johnson, *The Meaning of the Body*, p. 247.

musical movement in terms of the MOVING MUSIC metaphor and the MOVING OBSERVER or MUSCIAL LANDSCAPE metaphor. According to the former, we conceptualise music (or the musical now as it happens) in terms of a moving object, or, in other words, "our experience of a bit of music shares something with our experience of seeing objects move in physical space."[195] According to the latter, we conceptualise music as if it is us moving in an imaginary musical landscape.[196] The important thing, however, is that these conceptualisations are not coincidental or arbitrary; they are based, Johnson observes, on our very fundamental everyday experiences of motion, which for the most part are nonconceptual and pre-reflective: "we see objects move"; "we move our bodies"; and "we feel our bodies being moved by forces".[197] "It is", therefore, "primarily our experience of seeing objects move that gives rise to the MOVING MUSIC metaphor and that it is primarily our experience of moving our own bodies from one place to another that gives rise to the MUSICAL LANDSCAPE metaphor."[198]

In what follows, I will start by I exploring the nature of the experience of movement, both in relation to music and to moving objects, with the goal of isolating those basic elements of movement in order to develop a systematic method or language of capturing this experience, either from the perspective of the moving music or the moving observer/listener. More specifically, this language will comprise those elements of movement that carry a specific expressive meaning, in relation to both the structure of music and whomever engages with music. When below I present the Bouncing Ball analytical representation, therefore, this should not be understood as the actual body movement that a listener might do while listening to music or a performer while performing but as an analytical reduction of the various ways movement is experienced, illuminating its underlying expressive shape and meaning. In addition, this analytical reduction will not convey any extra-musical content but one that has a more universal and structurally dependent meaning. As already suggested in the previous chapter, the primary focus will be the rhythmic/metric aspect of this movement experience, giving particular emphasis not only on the boundaries of rhythmic/metric groups but especially on the precise character of the various dynamic processes of gestural shape. While the Bouncing Ball representation will convey expressive movement in a more direct manner,

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[195] Ibid., p. 249.

[196] In relation to the Moving Music metaphor Johnson mentions commons expressions such as "here *comes* the recapitulation", "the strings *slow down* now", and " the music *goes faster* here". In relation to the Moving Landscape/Observer metaphor, he gives expressions such as: "we're *coming to* the coda", "when we *get to* measure 57, we'll see how the dissonance is resolved", and "we're *going faster here* (said in reference to a point in the score)". See Johnson, The *Meaning of the Body*, pp. 248-50.

[197] Johnson, *The Meaning of the Body*, p. 247.

[198] Ibid., p. 252.

by strengthening the analyst's empathetic bodily involvement with the music, the complementary gestural arrow representation will provide a more explicit/conceptual description of the meaning of the gestural processes involved.

The most commonly observed movement in relation to musical experience is perhaps foot tapping, associated with the tracking of the beat (tactus) or the metrical structure of the music. Synchronising our bodies to the periodic structure of music (commonly referred to as "entrainment") can also be done in many other ways, involving other parts of the body. What is unique about this type of movement is the fast acceleration of some body part towards some direction and the sudden stop of motion or change of direction at the attack point of some strong beat. This is the most basic type of synchronising to musical movement and it is so important that the lack of ability to do so is generally associated with a lack of basic musicality.

In Figure 3.1 I show three variations of this beat-conveying movement. In both foot-tapping and hand clapping, for example, movement can either stop suddenly after the colliding moment as at Figure 3.1a, or bounce back as at Figure 3.1b. This movement can also take place without any surface collision as would be the case with the conductor's hand gestures or our head-nodding. The elliptical movement of Figure 3.1c is another variation of this movement that does not usually involve any collision. It is very frequently used by the conductors as well as by the dancers both of whom explore a wide range of such elliptical hand/body movements to express the music. The pendulum's or the children's swing movements are two more very characteristic examples of this movement, although not normally associated with music. What's unique about this third type is that the moment corresponding to the musical beat is not as visually obvious (or strong) since the trajectory of the movement does not involve a 180-degree change in direction. It can therefore be used to express a variety of other more smooth and flowing expressive nuances.

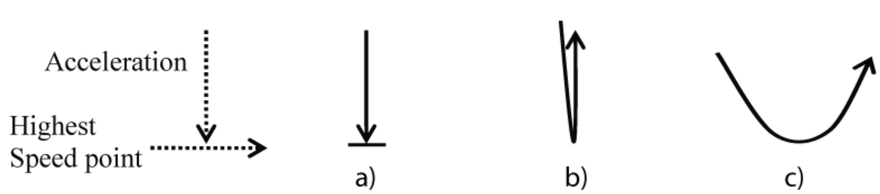

Figure 3.1 Three basic beat-conveying physical movement types.

Although all of these movements involve overt physical motion in space-time, some of them, such as subtle head-nodding, for example, are less obvious than others. Beat can also be experienced physically by suddenly tensing and relaxing some muscle of the body, without causing any apparent body displacement. A characteristic muscle movement of this type is tensing of the abdominal muscles resulting in a short and fast breathing out. A similar movement is needed when somebody is actually producing musical sounds: to produce a clear sung note attack one has to tense the abdominal muscles in order to squeeze the lungs and force air to pass through the vocal cords. If a continuous sound is needed, then the muscles remain tense in order to keep the air of the lungs running out the body. If an accented staccato note is intended then only a sudden tensing/relaxing movement is necessary.

It is not uncommon for people to hold their breaths during certain passages while listening to music, the same way they would do so at a highly suspenseful moment while watching a film. In music, this is an indication of empathising with a more tense passage of music or some relatively long anticipating or anacrustic passage. Upon the arrival on some expected goal downbeat, the remaining air is freely let out, relaxing the body. Other muscles of the body normally follow similar tensing and relaxing patterns. Body/muscle movement, thus, synchronises not only with beat onsets but also with the processes that precede and follow them, constituting a measure of someone's sensitivity to the rhythmic and expressive subtleties of music.

I should repeat here that one does not need to exhibit overt physical movement in order to be considered receptive or sensitive to the expressiveness of music. (In fact, one does not even have to exhibit any real physical movement at all; as we will see below, it can all happen in the imagination of the listener, which is informed by the experience of embodied motion.)[199] Unlike dancing to the music, which is a conscious kind of activity that involves apparent movement, the bodily reaction to music's expressive power, as a result of just listening and enjoying music, is normally unconscious and involuntary and involves internal subtle muscle movements. That is one of the reasons that make their observation and measurement very hard. The same way a lot of our thinking processes are nonconscious and involuntary, the body, a very important perceptual organ itself (a complex system involving a variety of sensory-motor functions that cannot be separated from the workings of the mind), works quietly at the background so to speak, or "hides

[199] Stern explains how real movement (although imperceptible to the eye) is involved even when we imagine a movement: "When someone imagines a movement with its vitality form, something happens in the cortex that then sends a signal to the appropriate motor areas to activate the musculature of the body that would have been used if the imagined event were enacted". See Stern, *Forms of Vitality*, p. 133.

out", in Johnson's words, "in order to make possible our fluid, automatic experiencing of the world".[200] Nevertheless, we do "feel a feeling", in spite of the fact that "we never feel our internal organs generating that feeling".[201]

Raising these internal muscle movements to a more conscious level, and classifying them into general basic patterns, will help us better understand their meaning, or this feeling they give rise to. These muscle patterns are shown in Figure 3.2. We've already encountered one type above in relation to beat tracking; this is the sudden tensing and relaxing of some body muscle, reacting to some strong beat such as an expected downbeat or some other strong low-level musical accent (see Figure 3.2a). Such muscle contractions are not meant to cause any physical movement even though they may involve very small ones. Not all muscle contractions, however, involve both tensing and relaxing patterns in quick succession. Not uncommon is a muscle tensing that remains so for a while before it is succeeded by relaxation (see Figure 3.2b). Unlike the first type, which corresponds to isolated musical moments, this second type responds to larger-level rhythmic relations such as a strong-weak beat succession.

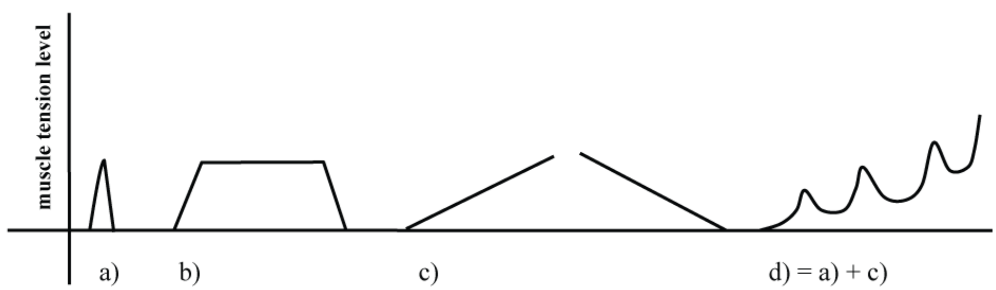

Figure 3.2 Taxonomy of general muscle-movement patterns.

In contrast to the two sudden muscle movements we saw above, muscles can also tense or relax in a more gradual fashion over longer time spans (see Figure 3.2c). The most typical and conscious gradual muscle movements are the ones required for inhaling and exhaling. Such muscle movements can occur in different degrees of gradualness and can involve different muscles of the body. In addition, their increase or decrease phase can either occur in a smooth or pulsated manner. A natural slow breathing in or out cycle would be an example of the former. Sobbing would be an example of the latter,

[200] Johnson, *The Meaning of the Body*, p. 5.
[201] Ibid., p. 6.

involving a series of sudden tensing-relaxing muscle patterns gradually increasing or decreasing in strength. This pattern, shown in Figure 3.2d, is actually a combination of types a) and c). Different kinds of combinations of all of these muscle movement types can result in more complex patterns as demanded by the complexity and richness of a musical experience.[202]

The correspondence of the first three types of muscle movement to the physical beat-conveying movement types shown above in Figure 3.1 should be obvious: the quick tensing/relaxing muscle pattern is analogous to the second movement type (Figure 3.1b); the tensing-relaxing with a tension-hold in between is analogous to two successive acceleration-stop movements back and forth (Figure 3.1a); and the gradual tensing and relaxing with a relatively slow third movement type (although if this third movement takes place fast it can be analogous to the first muscle type).

But how do these muscle/body movements come about in reaction to the music? Imagine a series of musical events occurring every two seconds. Then imagine that, after hearing this sequence for some time, the interval between these sounds starts to become shorter and shorter. A typical way of describing the above would be something like: in the beginning, the musical sounds (or the music) move slowly and then after some point they start moving faster and faster. Of course the sounds don't move, but just *occur* after shorter time spans, *replacing* previous ones.[203] What moves then? As we saw above, movement seems to take place instead either in listeners' bodies (in a covert or overt manner) or in their imagination as a result of observing movement around them or of their own bodily experience of movement in relation to music or in everyday life. The music moves because we react to it in terms of different kinds of movement, projecting this motion back to music.

One explanation of how this happens has been proposed by Arnie Cox in his "mimetic hypothesis", according to which "part of how we understand music involves

[202] The taxonomy of "sound-related gestures" described in Godøy and Leman, *Musical Gestures: Sound, Movement, and Meaning* corresponds closely to my taxonomy of general muscle movements presented here: types 3.2a and b correspond to their impulsive gestures, type 3.2c to their sustained gestures, and 3.2d to their iterative gestures. See Godoy, "Gestural affordances of musical sound" for a more general discussion of these types. For a more detailed discussion, see Jensenius et al, "Musical gestures: Concepts and methods" and Dahl et al, "Gestures in performance".

[203] See Rothfarb, "Energetics", p. 928, discussing the question "what moves in music". Roger Scruton's distinction between "sound" and "tone" is particularly clarifying with regard to this: "When we hear music, we do not hear sound only; we hear something *in* the sound, something which moves with a force of its own. This intentional object of the musical perception is what I refer to by the word 'tone'" (Scruton, *The Aesthetics of Music*, pp. 19-20). Building on Scruton, Cook points out that "musical lines have no material existence; they only exist in terms of the metaphor of space, a metaphor which Scruton considers to be so deeply entrenched in the experience of music as to constitute one of its defining properties" (Cook, *Music, Imagination, and Culture*, p. 24).

imagining making the heard sounds for ourselves, and this imagined participation involves covertly and overtly imitating the sounds heard and imitating the physical actions that produce these sounds".[204] Recent empirical evidence has verified the ability of people to imitate various kinds of "sound producing" gestures (including those that serve to avoid fatigue and discomfort as well as those that serve articulation and expressivity), reproducing quite well both the geometry of movement trajectories as well as their dynamics (i.e. the speed, acceleration, force and effort).[205] Very important is that this (largely involuntary) mimetic participation can take place across modalities so that while hearing the sound of a violin, for example, I could imitate the actual gestures of the arm or fingers involved in the production of this sound (whether I watch it or imagine it), but I could also imitate them subvocally (by "singing along" as if the violin imitated were a singing voice) or even internally/viscerally imitate the energy pattern or exertion dynamic of the act of producing these sounds heard.[206] In reality, it is expected that people physically react to music in ways that may combine different or all of the aforementioned ways and that will depend both on the prior experience of the specific person and the specific situation: singing along the music for example may also involve imitating various sound producing gestures combined with other more free dancing-like movements.

When however this imitative urge cannot be satisfied in the most immediate and physical manner, such as when we are confined on the chair of a concert hall, for example, it can be channelled in different ways. "The experience of sitting quietly in a chair" and listening to music", according to Johnson, "is almost unnatural, for our bodies want to move with the music. This is why music and dance are so closely and happily intertwined".[207] This urge, therefore, is partially satisfied by imagining this movement (either of ourselves or of somebody or something else) or by internally tensing and relaxing our muscles, which itself can also be experienced as a kind of psychological tension.

The psychological component of our experience of musical movement, which is related (although not equated) in different ways to both imagined and bodily movement (including internal muscle tension), is very important too. In particular, our expectation

[204] Cox, "Hearing, feeling, grasping gestures", p. 46. See also Cox "The mimetic hypothesis and embodied musical meaning".
[205] See Godøy, "Geometry and effort" and "Gestural Affordances"; Godøy et al., "Playing 'air instruments'"; and Haga, *Correspondences*.
[206] See Cox, "Hearing, feeling, grasping gestures" discussing various empirical studies supporting these claims.
[207] Johnson, *The Meaning of the Body*, p. 236.

of what will happen next is very decisive in shaping musical meaning and experience. Consider two musical stimuli occurring successively with time distance A between them. Upon listening to the second one, we develop an expectation that a third such stimulus will occur after the same time span. This is due to some innate tendency to favour regularity over irregularity in the way the world is organised around us. If the two sounds are of equal sound level, we expect the third to be of equal sound level too. If, however, the second is louder or softer then we expect the third to be even louder or softer respectively and so forth. In other words, we expect the pattern that has begun to continue.[208] When what we actually hear does not fall within such regular expected patterns, more complex musical meanings occur.[209]

Expectation of cyclic movement can very effectively be understood in terms of the movement of a bouncing ball. Each cycle in this case is not only experienced mentally and physically but also visually: the visualisation of the trajectory of each bouncing ball motion can arouse more specific expectations about when exactly the ball is going to hit the ground again. In the ideal world where no loss of energy occurs, when a ball finishes one cycle of motion, we expect the ball to repeat that same trajectory in the same amount of time. In a series of many such bouncing ball cycles of equal length, the expectation of yet another one of the same length becomes even stronger. In the real world, however, where loss of energy takes place, after we see that the second trajectory is smaller and occurs after a shorter time interval we expect that process to continue, until the ball cannot bounce any more.

The location of the next stimulus (or ball bounce) is not the only element of our expectation. As we have already seen, the loudness or strength of the stimulus (or ball impact) is also an important element of expectation. In an equally-spaced sequence of musical stimuli of the same loudness, we expect another one of the same loudness too. But in a real music example where loudness varies at the performer's will, expectation is shaped not only by the loudness of the previous goal note but also by the *process* of reaching that expected goal. If we experience a passage that accelerates and crescendoes as it approaches the expected downbeat, we expect the loudness of the goal note to fall

[208] For an exhaustive discussion on such rhythmic expectation processes see Hasty, *Meter as Rhythm*. Expectation processes with emphasis on melody have been explored in particular by Narmour's Implication-Realization model of melodic expectation, building on Meyer's application of Gestalt principles of musical expectation. See Narmour, *The Analysis and Cognition of Basic Melodic Structures: The Implication-Realization Model* and *The Analysis and Cognition of Melodic Complexity: The Implication-Realization Model*, and Meyer, *Emotion and Meaning in Music*.

[209] For Lussy, this is actually how musical expression arises. Distinguishing between *metrical*, *rhythmic* and *expressive* (*pathétique*) accents, he believes that "the expressive accent makes its effect primarily as a 'surprise' or 'exception' to the regularity of metrical and rhythmic accents" (Caplin, "Theories of musical rhythm", p. 676).

within the pattern that precedes it. Such anacrustic patterns give clues not only about the loudness of the expected goal event but also about its location. The expected regular pattern of metric cycles can be modified anytime: a metric cycle can be elongated, for example, and that can either occur more smoothly, by allowing the process up to that point to prepare the listener, or more surprisingly, by not satisfying the listener's expectation. In the case of the bouncing ball, the process of preparation of the ball collision is our experience of watching the ball approaching the surface of the collision. In music we can only sense it through the cues we get from the musical structure.

These expectation processes I have just described are very significant since they give movement a very dynamic and forward-moving character. We don't simply tune our bodies to the rhythms of the music in a passive way, as two vibrating objects would, but we engage with it more actively, contributing to the experienced goal-directed motion ourselves, too. Before I go on and formalise our experience of expressive movement in terms of the movement of the bouncing ball, I will briefly talk about the basic elements of observed movement in space-time as they influence our own psychosomatic experience.

The *speed* of a moving object is one of the most important elements of movement, one that has perhaps the most influence on our psychosomatic experience. It makes a big difference to see a car, for example, moving very slowly or far exceeding the speed limit. High speed always makes people tense and nervous of the anticipated consequences of a possible crash. But even in cases when negative consequences are not the main issue of concern, as in the case of taking a ride on a roller coaster, the feeling of moving in high speed is something that affects the physical as well as psychic experience in various ways. This feeling of the *kinetic energy* of the moving object or self becomes more prominent especially in relation to the unmoving background environment. In addition to the absolute speed of movement, very distinct is also the feeling of accelerating in contrast to that of decelerating. The process of acceleration in an airplane right before takeoff, for example, is a very different experience from that of the sudden slowing down of your car in order to prevent a crash with the car in front of you.

The *direction* of the moving object or self is significant, too. Consider a bird, a plane or any other object moving upwards, downwards or in parallel to the ground. Downward motion always heightens your anticipation of the object's collision to the ground. It is also associated with higher speed and freer movement since the moving object is not going against the force of gravity. Most of us have jumped down from some relatively high point and experienced the pull of gravity while falling down and the pressure on our knees from the impact on the ground. We also all know the feeling of trying to jump up to some point and how much energy is required to go against the pull of gravity. Because of that experience, watching some other object or person go through that movement reproduces that feeling in us in different ways.[210]

Related to the direction of the moving object is its *angle* in relation to the horizontal axis. It's a very different experience to watch a plane, for example, accelerate down, or up, in 90 degrees against the ground compared to 45, 10 or 5 degrees; or going a full circle while taking a roller coaster ride as opposed to simply moving in an almost horizontal motion.

Finally, the bigger the *mass* of the moving object the higher amount of energy is required to move that object and the stronger the impact on some collision surface. It's a very different experience to watch a little frog jump around than a kangaroo, for example. Finally, in addition to the amount of mass, very important is the kind of mass: it's a different experience to watch a butterfly fly than a bat; in musical terms, the amount of mass moving would correspond to volume and/or textural thickness and the kind of mass the timbre of the sound heard. As for the correspondence of the other elements of movement, they will be discussed below.

3.2 The "Bouncing Ball" analogy

Having explored the importance of movement (both bodily and imaginary) in understanding and experiencing expressivity and meaning in music, I will proceed with formalising and further elaborating the above-mentioned observations of the relation between music and movement. My goal is to propose a practical means of talking more effectively and concretely about this (commonly described as ineffable) global dynamic feeling of movement experienced during music listening. Given the multisensory nature of music perception, the tools to be proposed will involve and encourage the use of a variety of modalities in achieving the ultimate pedagogical goal. Particular emphasis will be given on strengthening the visual/kinematic aspect of perception, which, in combination with the empathetic nature of people, will encourage more bodily involvement/hearing during music experiencing.

[210] The most prevailing explanation of this imitative, empathetic behaviour of humans involves the "mirror neuron system", a mechanism that assists learning and understanding as well as predicting and adapting to other people's intentions and behaviours. For a discussion of the mirror neuron system in relation to embodied cognition and music see Godøy, "Gestural affordances", pp. 108-110.

The graphic representation of Figure 3.3 will serve as an illustration of the mapping of musical to bouncing ball motion. What is represented here is the motional experience of the simplest possible musical pattern, a series of identical, equally-spaced musical sounds. This is mapped onto (or described in terms of) the motion of an imaginary bouncing ball, whose very smooth, flowing and cyclic manner of motion can capture effectively the experience of musical flow. We see here three "**motion cycles"** of ball bouncing (delimited by vertical lines, representing the moment of impact or accent) that correspond to the cyclic rhythmic experience of these musical sounds. The louder the musical sound the higher the imagined ball will bounce. The height of the trajectory of the ball is represented by the red/thick wave line and its speed by the blue/thin line. Alternatively, the height of the ball can be thought of in terms of its "potential gravitational energy", the energy it possesses as a result of the gravitational force exerted on it due to its specific height. Similarly, the speed of the ball corresponds to its "kinetic energy". As discussed in the previous section, when imagining a ball move, the values of these two parameters have a direct impact on the way we experience this movement, the same way listening to music does. In musical terms, these two parameters of movement will be referred to as "**Musical Tension**" (**MT**) and "**Rhythmic Drive**" (**RD**). Musical Tension represents the physical or psychological tension one experiences when listening to music and can be understood by analogy with the experience of empathising with the change of the potential gravitational energy (or height) of a bouncing ball: upon hearing the onset of a musical sound or watching a ball bounce, the tension (physical or psychological) one experiences follows the profile shown in the figure—a quick rise to a relatively high value followed by a decreasing tension phase until the following sound. For this specific musical situation, Rhythmic Drive follows the reverse profile: as the ball is about to bounce, or as we expect the onset of the following sound, we internally experience the forward-driving quality of the moving object or music; it can best be understood by analogy with the experience of empathising with the increase of the kinetic energy or speed of the moving ball, with the feeling of the urge to move with the ball. After the ball bounce or note onset, this kinetic energy quickly decreases until the preparation of the following bounce or sound begins.

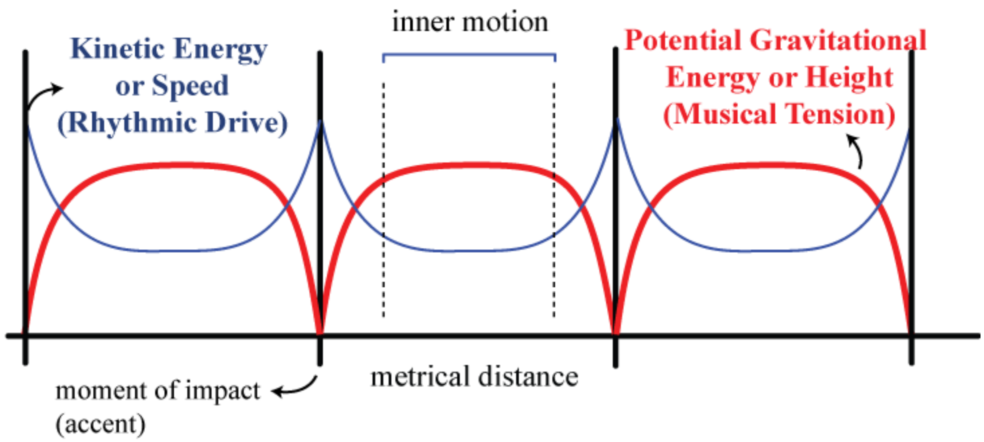

Figure 3.3 Graphic representation of the two components of musical/ball motion cycles. (*Media Example 3.1* Bouncing ball animation of regular beat cycles).

The choice of the movement of the bouncing ball for representing expressive movement can be explained by the fact that it can effectively capture important aspects of metric/rhythmic experience of music (such as the feeling of beat, accent, or goal moments) as well as dynamic gestural processes such as those of Anacrusis and Metacrusis we saw in the previous chapter.[211] The correspondence between bouncing ball movements, gestural processes and beat structure is shown in Figure 3.4a and b. At c and d, I show how the experience of these identical, equally-distanced musical sounds can be experienced at a higher level of structure, here grouped into twos. Note how the second sound in each two-note gestural group is experienced as a weaker bouncing or gestural movement. Even though the experience of this series of musical sounds may seem to be another way of describing the traditional notion of metrical structure shown at 3.4e, there is a significant difference between the two, which I would like to point out here. As seen in the previous chapter, traditionally metric structure is most commonly understood as the experience of a "regular, hierarchical pattern of beats to which the listener relates musical events."[212] Regardless of whether these beats are understood and represented in terms of dots, attentional peaks or other means, what's important is that they are not the actual music heard but an idealised structure, inferred by the listener from complex musical structures. In other words, metric structure is abstracted from the

[211] This can also be explained by a personal tendency to experience music in terms of movement and specifically bouncing ball like motion: the way I tend to recreate this movement is by hand while imagining at the same time a bouncing ball move. Recall Rothstein's similar experience with music quoted in Chapter 1. The motion of the ball has also been used to model the dynamic of a tonal musical phrase by both Dom André Mocquereau and Edward T. Cone (see Doğantan, "The body behind music", p. 458-59 and *Mathis Lussy*, pp. 150-57; and Cone, *Musical Form and Musical Performance*, pp. 26-28.)
[212] Lerdahl and Jackendoff, *A Generative Theory of Tonal Music*, p. 17.

music itself and kept conceptually separate. In contrast with this, the regular, symmetrical motion cycles shown in Figure 3.4 represent the experience of the actual sounds heard, in this case a succession of isochronous and identical series of sounds. This means that in more complex musical situations, these motion cycles no longer retain their symmetrical character. In addition as we will see in a moment, the profiles of MT and RD will not always be inversely related as in the musical example of Figure 3.3.

At this point, I would like to point out that the motion of the bouncing ball is an analytical invention that can be used both as a means of describing or communicating the expressive meaning of music and as a pedagogical tool for encouraging the experience of music in a more bodily way. As I will explain in Chapter 6, in order to make the description of musical expression in terms of the bouncing ball more practical, one would need to have a computer program that would make possible the creation of bouncing ball animations to go along the music analysed. For now, I will only explain in theoretical terms how the mapping of structure onto performance works, while using the graphs already seen above to convey these movements. Nevertheless, one could get the benefits of this kind of analysis by recreating this bouncing ball movement by means of free hand movement as if a bouncing ball; or by imagining this bouncing ball (or some other similar kind of) movement; or even by imagining oneself moving/dancing as if a bouncing ball.[213] Even while moving in imagination as if a bouncing ball, one can experience, as explained above, Musical Tension internally as muscle tension and relaxation, and Rhythmic Drive as the urge to move forward. At the same time MT could also be understood in terms of a psychological kind of feeling tension, what Schering has described as the unceasing tension-release cycles of the mind.[214] Similarly, the psychological aspect of RD, or the urge to move, is a kind of Kurthian "psychic energy", empathising with the kinetic energy of linear-dynamic musical movement.[215] Nevertheless, both the psychological and the actual physical movement are interrelated, the one influencing and encouraging the other, and both together shaping the experience of musical movement, this global feeling of "vitality" or dynamic expressive movement.

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[213] Encouraging the use of bodily gesture as well as the imagining of movement while listening to music is pedagogically very important. It is based on the idea of embodied cognition that gestures are integral to music perception. According to Godøy, "perception and cognition of musical sound is intimately linked with mental images of movement, and that a process of incessant motor imagery is running in parallel with listening to, or even just imagining, musical sound". He particularly stressed the privileged role that hand movements have in what he calls *motormimetic cognition* and their ability to "trace the *geometry*…,as well as convey sensations of *effort*, of musical sound." (Godøy, "Geometry and effort", p. 205) See also Godøy, "Motor-mimetic music cognition".
[214] See Rothfarb, "Energetics", p. 929.
[215] About the energeticist aspect of Schering's work see Rothfarb, "Energetics", p. 929 and 944-46. About Kurth's work see pages 939-944.

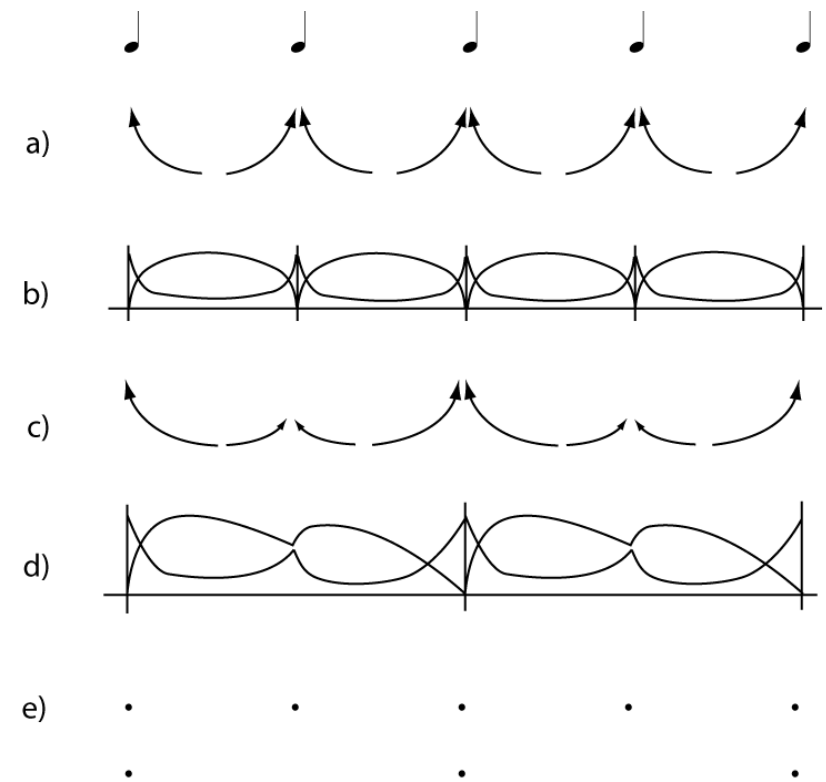

Figure 3.4 The experience of identical and isochronous musical sounds at different levels of structure.

Before I go on and show how the bouncing ball movement can be used in the analysis of an actual piece of music, I will need to explain a few more things about the nature of these motion cycles shown in Figures 3.3 and 3.4, as well as about their shaping forces. Each of these specific motion cycles, which is of the simplest and most symmetrical kind, is the result of only one musical sound, the properties of which will modify mainly the attack moment, the very first and last parts of each motion cycle as shown by the dotted lines in Figure 3.3: the articulation (duration) of the sound for example (ranging from staccato to full sound duration) will change the strength of the attack movement and by consequence the speed profile of the bouncing ball—a staccato note will result in a greater and more abrupt speed reduction than a full sounding one. Similarly, the specific attributes of an instrument's tone quality will affect imagined movement. The tone of the piano, for example, which has a relatively strong attack and quick decay, corresponds to a more sudden speed decrease at the beginning of the motion cycle. That of the oboe, on the other hand, has minimal decay after the initial attack. In addition to the articulation of the sound, its actual loudness will also have an effect on the bouncing ball movement: in a series of sounds that get louder, the imaginary ball bounces increasingly higher while its speed right before and after the impact increases accordingly (in order for the ball to bounce higher, its speed has to be higher too.) Similarly, in the case of the crescendo of a continuous sound, the corresponding bouncing ball movement would be a gradual rise of the ball.[216] The opposite applies to the experience of a decrescendo. In sum, the strength of the beginning of a tone is measured by both its loudness and its manner of articulation. For the sake of comparison, imagine a continuous sound of unchanging loudness. The corresponding bouncing ball motion would be that of a ball moving horizontally with constant speed and height, experienced as musical movement of constant MT and RD.

In the case of the above musical example, a musical motion cycle is shaped by a single musical sound, while its inner part takes the simplest possible shape. In more complex situations, where a given motion cycle may be shaped by more than one sounds, its shape can take a variety of different shapes. Figure 3.5 redraws Figure 3.3 to represent the more generic or prototypical definition of a musical motion cycle and how it corresponds with the gestural processes of Anacrusis and Metacrusis.[217] After the ball impact or note onset, we have a quick rise in MT and then a decreasing phase in both MT and RD, which makes possible the metacrustic gesture. The reverse process takes place during the second half of the cycle, making possible the anacrustic gesture. I already talked about how the very first and last short parts of each cycle can vary as a result of the different strength of the note attack or different manner of articulation. The inner part of this longer motion cycle can vary in complex ways so that MT and RD can increase or decrease independently during different phases of the cycle. The representation of Figure 3.5, therefore, has moved beyond the regular bouncing ball motion of Figure 3.3, which is controlled by the constant force of gravity, to one that can accommodate our imaginary bouncing ball, whose motion can be controlled instead by constantly changing musical forces, or the laws of embodied perception and cognition. This imaginary bouncing or musical ball can therefore bounce in all kinds of creative ways on different surface

[216] This seems to contradict the empirical data gathered by Eitan and Granot (as described in their article “How music moves”), who found that the experience of a crescendo only corresponds with an imagined increase in speed and not of vertical direction. The explanation of this is probably due to the fact that, in the experiment they conducted, they asked the subjects to imagine some human character (cartoon) moving in relation to music. However, humans don’t normally imagine human characters flying in the air in synchrony to the music. While we can easily imagine someone dance to music, dancing does not involve moving on the vertical dimension since humans cannot fly. Imagining a bouncing ball, on the other hand, moving to the music allows one to explore the way the vertical dimension relates to musical experience too.

[217] The generic or prototypical motion cycle shown in Figure 3.5 aligns well with Riemann’s theory of expressive performance, presented in *Musikalische Dynamik und Agogik* of 1884 as a theory of *dynamic shading*, according to which the delivery of a rhythmic unit requires a crescendo-accelerando up to the accent followed by a diminuendo-ritardando. This is what later in his *System der musikalischen Rhythmik und Metrik* of 1903, he universalized as the model of *upbeat–accent–afterbeat* as the essence of all rhythmic structures in music. See Doğantan, “The body behind music”, p. 457.

levels, even stop at times at places like fermatas, and begin moving again in different speeds, acceleration rates and directions.

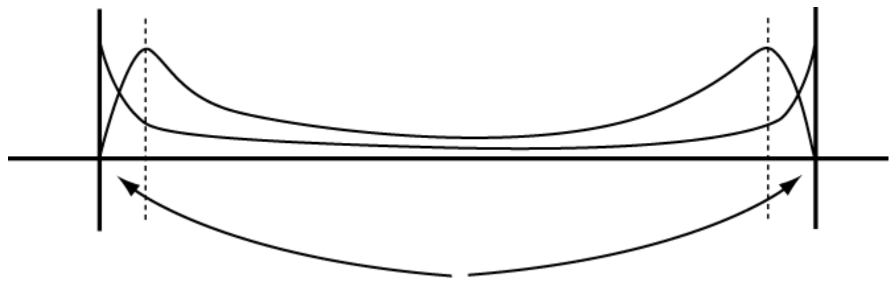

Figure 3.5 Generic or prototypical motion/bouncing-ball cycle.

In the next chapter, I will describe in more detail how the perception of musical structure shapes musical motion or musical experience. For now, it will suffice to say that different structural parameters of music contribute in specific ways towards shaping either MT or RD. This is summarised in Figure 3.6. Here, I divide musical parameters into two categories: those relating to the compositional structure (metric/rhythmic and pitch structures) and those relating to the performance structure (tempo, dynamics and articulation) of music. Here are two examples of how two of the main performance structure parameters shape musical experience: dynamics, and more specifically gradual crescendos and decrescendos, generally modify the experienced MT patterns, increasing or decreasing tension values respectively; tempo fluctuation will generally influence mostly the experienced RD of music—that is, accelerating or decelerating of the music will encourage increase or decrease of RD respectively. To a lesser degree tempo fluctuation will also influence MT as the dotted arrow indicates. In any given piece, many such contributions of different structural patterns will join forces to shape the overall experience. The musical examples that follow will make this clearer.

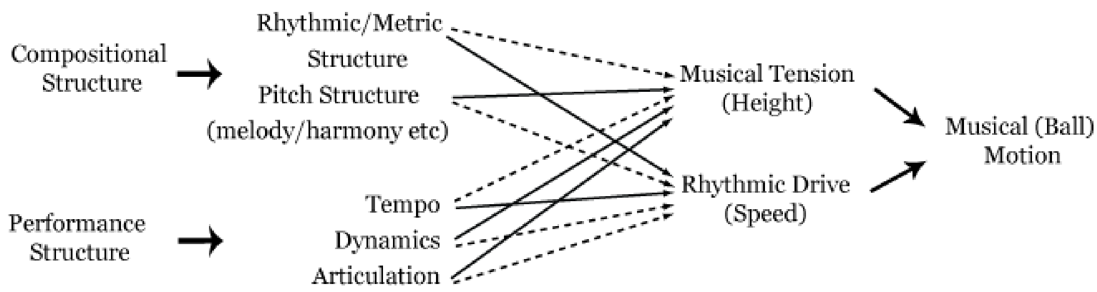

Figure 3.6 Contribution of compositional and performance structural parameters in shaping musical/ball motion. (The main contributions are represented with solid-line arrows and the secondary ones with dotted-line arrows.)

I should note here that since this overall experience is obviously contextually dependent, different listeners (with different backgrounds, experiences, interests, etc), on different occasions, will inevitably experience music in different ways. It is expected that different listeners will focus on different aspects of musical structure in different degrees so that the corresponding overall musical motion experience might vary to a certain degree: someone might happen to focus, for example, more on some inner voice rather than on the main melodic line, or focus more on the lower level of rhythmic/metric structure rather than on broader rhythmic processes, etc. These differences will reflect someone's analysis of the motional structure of a piece as well. Nevertheless, there is considerable empirical evidence that when listeners focus on specific aspects of musical structure, their corresponding gestural understanding of them shows significant similarities.[218] I should also note that even when the way people bodily react to music may show apparent divergences, this does not mean that their overall qualitative gestural meaning will necessarily, and always, differ. There is a difference, in other words, between the actual observed bodily movement of listeners and its qualitative expressive meaning, which synthesises a number of different ways (bodily/somatosensory and psychological/imaginary) movement is experienced. This latter meaning is what my Bouncing Ball representation (or the arrow notation to be explained below) aims at capturing, which means that a given bouncing ball gestural shape could represent the meaning of a number of different (although expressively similar) bodily gestures.

[218] See Haga, *Correspondences between Music and Body Movements*. For an overview and an attempt to come up with a conceptual framework to understand the complexity with which listeners gesturally react to and understand music see Godøy, "Gestural affordances of musical sound", and Godøy and Leman *Musical Gestures.*

Always acting in parallel with these structural contributions is the process of expectation I discussed above, which gives a more dynamic and goal-directed character to musical motion. "**Goal Direction**" (**GD**), together with MT and RD, will constitute the three elements of musical motion whose values and patterns will shape the particular character of music. GD can be forward oriented, as in the case of an anacrustic process, where expectation drives one's attention or bodily rhythm towards a new cycle beginning; or backward oriented, as in the case of a metacrustic process, where attentional or bodily gravitation is directed towards some newly-occurred cycle beginning. In the example of Figure 3.3, what gives goal-directed character to the experience of musical flow is the established expectation for the occurrence of musical sounds at regular intervals of time. In other words, this expectation is what gives the cyclic arch-like shape of motion cycles. Imagine hearing an isolated sound and think of it in terms of a ball bouncing on the ground. Since a single isolated sound cannot give any clues and set up expectation for what might follow next, what is experienced has no GD. The ball bounces and either stops moving after reaching some height, or keeps moving upwards until it disappears from our imagination. Once more sounds are involved, expectation is established and motion cycles begin to take smooth arch-like shapes. As we will see below, when a given motion cycle is shaped by longer and more complex structural patterns, GD will be shaped not only by the expectation of the location of the following motion cycle beginning but also by the moment-to-moment process of reaching that expected beginning. This structural process provides feedback that can encourage and ongoing re-evaluation of expectation and of the directionality of musical flow.

Let's now look at a real musical example—Chopin's Prelude No17 in A♭ major, two excerpts of which are shown in Figure 3.7. We will first look at the compositional structure of the piece and see how it will influence both the performer playing the notes of the score and the listener experiencing the musical sound. The repetition of the twelve identical chords in the first two bars gives a number of different possibilities to performers. With the exception of the notated metre ($\binom{6}{8}$), which may suggest the projection of an analogous hierarchical pattern of accentuation (groups of three, six and twelve), the performers are free to decide what effect they want these introductory bars to have. They may either choose to project some clear and predictable accentual pattern that will help the listeners get the metric feel right from the start, or shape a broader, more open-directed pattern that will keep the listeners' expectation in check.

Figure 3.7 Chopin's Prelude Op.28, No.17 in A♭ major. a) Bars 1-20; b) bars 31-40.

Figure 3.8 shows how Cyprien Katsaris chose to perform the beginning bars of the prelude. Here are shown the dynamic fluctuation graph (top blue graph) extracted from the recording of this performance, and a tempo graph, which indicates relative tempo values at the quaver beat level (i.e. going up in the graph means getting faster).

Dynamic fluctuation can also be accessed through the waveform of the sound file, also included in Figure 3.8 for those who find it more intuitive than the dynamic graph above. (The location of the beat is shown here by the vertical thin lines. Dark vertical lines indicate the notated barlines and the green squares on the tempo graph represent salient musical accents, which, in this case, mostly coincide with the metrical structure of the piece.)[219] Since the compositional structure does not suggest any particular gestural shape for these first two bars, the performance structure comes in to shape a very well-articulated arch-like motion defining this first two-bar motion cycle. This is achieved through a gradual rise and fall in both tempo and dynamics, which encourages an increase in RD and MT respectively (see the first two bars in the motion graph of Figure 3.9). This symmetrically shaped motion gives not only a more dynamic character to this passage but also specific Goal Direction. After the change in movement direction around the beginning of bar 2, the listener expects this process to complete symmetrically after about the same duration. This process does indeed complete as expected, announcing the beginning of a new motion cycle on the downbeat of bar 3.

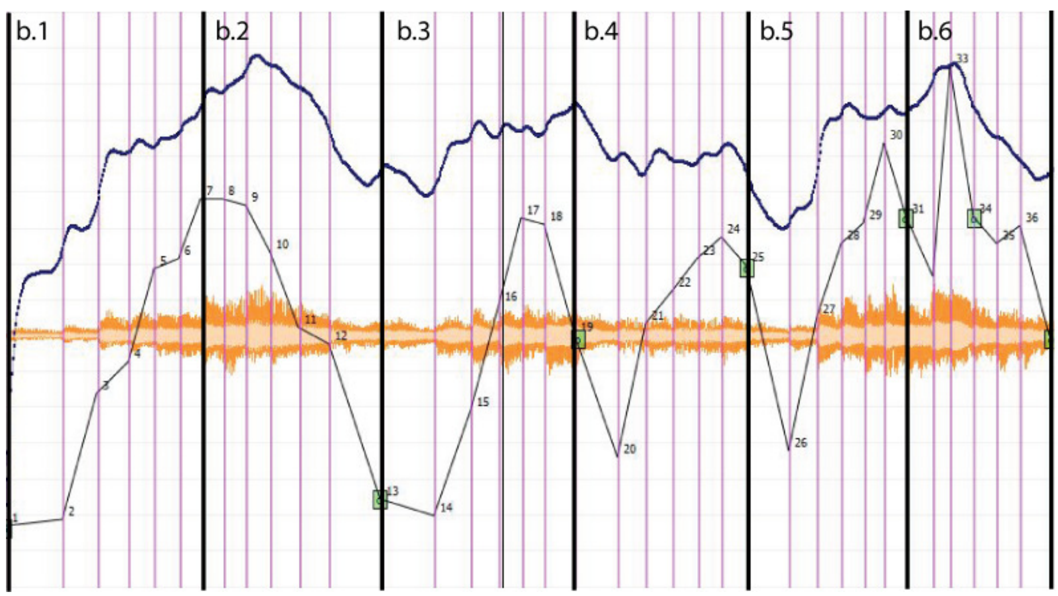

Figure 3.8 Performance structure (tempo and dynamic fluctuation graphs) of bars1-6 of Chopin's Prelude No.17 as performed by Cyprien Katsaris (1992). (*Media Example 3.2* SV video capture of Figure 3.8).

[219] Figure 3.8 is a snapshot of work created in the computer program *Sonic Visualiser* with the help of plugins created by Craig Sapp for the CHARM "Mazurka Project".

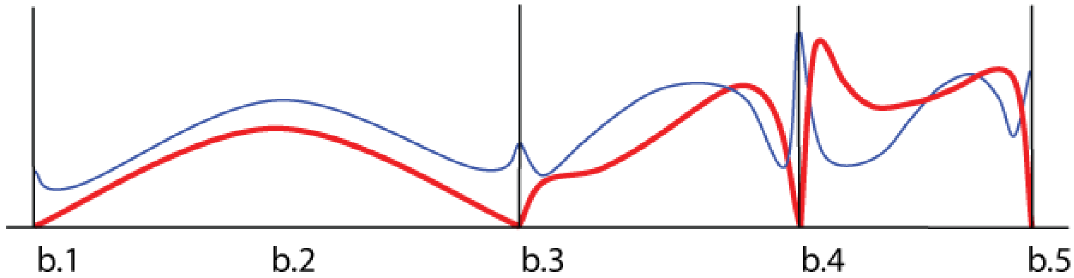

Figure 3.9 Bouncing ball graph of Cyprien Katsaris's performance of bars 1-4 of Chopin's Prelude No.17 in A♭ major (showing one two-bar long and two one-bar long motion cycles delimited by the vertical lines) (*Media Example 3.3* Bouncing ball animation of Katsaris's performance, bars 1-6. To indicate more clearly the beginning of a new motion cycle, the bouncing ball movement here changes direction at the end of each cycle).

What's unique about this two-bar long experience of gestural motion we've just seen is the way its inner part has been shaped by the performance parameters. A more typical motion cycle—at such a relatively low level of structure—is normally dominated by its beginning accents, as in the one we saw in Figure 3.5, where the energy level is much higher than in its inner part. In Katsaris's performance of the opening bars, the distribution of energy is reversed. The accents before and after this opening motion cycle are weakened, allowing the inner part to grow stronger as shown in the motion graph of Figure 3.9. The low dynamic level of the opening of the piece can only shape a very weak beginning attack: notice how in the Figure 3.9 the movement of the ball at the very beginning does not involve a sudden rise in height as compared to the beginning of bar 3 and especially of bar 4. Nevertheless, the very beginning sound of a piece, no matter how low in dynamic value, will always create some degree of accentuation, as indicated here by the sudden decrease in RD at the very beginning. In approaching the third bar, the decreasing process in both MT and RD creates expectations for a similarly weak beginning motion cycle attack. As mentioned above, while RD and MT are always inversely related during the processes that help articulate beginning accents (that is, right before and after these beginnings), the inner part of motion cycles can be shaped more freely according to the specific longer structural processes involved; in this particular case, they both increase and then decrease as opposed to the prototypical motion cycle shown at Figure 3.5, where they first decrease and then increase.

In translating tempo and dynamic values to musical motion values, what matters most is the general pattern seen in each structural parameter and not minor surface details. See, for example, how the tempo and dynamic fluctuation graphs of Figure 3.8 do not follow smooth arch-like shapes as their corresponding motion graphs of Figure 3.9. Even though such minor details do create at times particular expressive effects, they do not change the overall process of musical motion, which is my main concern here. Extensive analysis of such more surface-level expressive details will be discussed in the fifth chapter, which deals more exclusively with the analysis of performance. Also note that in creating bouncing ball motion graphs, I don't simply consult tempo and dynamic graphs, doing a kind of one-to-one mapping of Figure 3.8 to 3.9. Even though to a large extent the MT and RD profiles follow the overall shapes of tempo and dynamic graphs, more parameters are taken into account such as the compositional structure. Since in the first two bars the compositional structure was very simple, not much was taken into account apart from where this series of the repeating chords begins and ends. More will be said about the contribution of the compositional structure in relation to the following bars. I should add that very important in the process of doing this kind of analysis is also the consultation of the ear or bodily experience: in addition to doing the more conceptual kind of analysis by studying both the score and performance graphs, I listen to the performance of this piece and imagine a bouncing ball movement that matches my hearing experience.

In the following two bars of the Prelude, the performer confronts a significantly more complex compositional structure. This structure has a more particular expressive character that will influence not only the final experienced expressive movement but also the performer's interpretational choices. I will refer to the contribution of the expressive character of the compositional structure as the "**expressive potential**" of the music. It is potential because the compositional structure is not yet realised in sound and thus not yet experienced by anyone. It is up to the performer to decide how to negotiate with this expressive potential, and what expression to project through performance. Even though performers are free to project whatever expression they desire, the expressive potential as we will see in a moment, and in more detail in the following chapter, does act as some kind of influencing force on them. In other words, performers constantly strive to balance their creative freedom with the demands (and expressive power or potential) of the particular compositional structure.

Figure 3.10 shows a representation of the expressive potential of bars 3-4 of the Prelude, as specified by the score. These two bars contain the main motivic idea of the piece, which appears again and again in different harmonic and melodic contexts. They act as one unified gestural idea, symmetrically structured around the motion cycle beginning of the downbeat of bar 4, as illustrated in the motion graph here. The main factors involved are the unstable V^7 harmony of bar 3, which increases MT as it approaches the tonic on the following downbeat accent, and the "anacrustic" or goal-directed durational pattern ("short-short-…long" from weak to strong metrical beat), which mainly increases RD. This process is reversed in bar 4: the 9-8 suspension on the tonic chord shapes a decrease of MT, and the relatively longer notes at the end of the motivic phrase allow for a decrease of RD. Thus, the main processes in this two-bar motion pattern are increase followed by decrease in both MT and RD. The local modification of the values of these processes as the accent is approached and left do not affect the overarching pattern, but instead make possible the focal point around which these processes unfold.

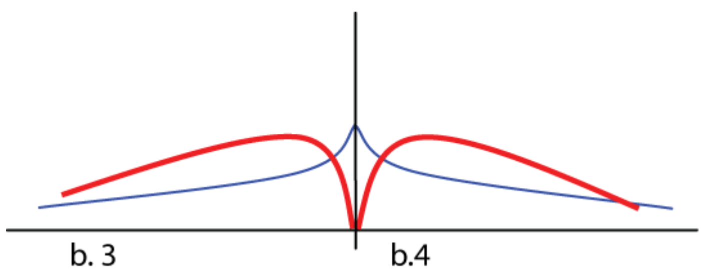

Figure 3.10 Expressive potential of bars 3-4 of Chopin's Prelude No. 17 in A♭ major.

The expressive potential shown in Figure 3.10 acts as some kind of musical force that encourages performers to play it in a way that strengthens this process even further. This is, however, only one of the influencing factors that shape performance and the final experienced expression. The performer can go against the expressive potential and reshape it as desired. This is not the case with Katsaris's performance, however, which does not alter these patterns in any fundamental way. The accelerando and crescendo of bar 3 (see Figure 3.8) are in phase with and thus strengthen further the increasing RD and MT patterns suggested by the expressive potential (see the graph of Figure 3.9). A quite typical expressive detail added by the performer in such anacrustic patterns is the pronounced tempo delay right before the new motion cycle beginning (see time-points

17-19 at the very end of bar 3 in the tempo graph of Figure 3.8), which encourages an analogous RD decrease. The effect of this tempo delay is a more “rounded” or lower-impact downbeat accent, as a result of a more “carefully” approached motion cycle beginning by the performer. The same effect is also present at the end of the following bar. Compare this with the way Shura Cherkassky approaches the downbeat accents of the same passage from the recapitulation (bars 35-37) (see Figure 3.11). The first downbeat (bar 36, corresponding to bar 4) is approached with a crescendo and accelerando without any local tempo delay, giving a more forceful and edgy character to the accent. The second downbeat is approached even more forcefully, due to the surprisingly early entry of an accented low D in the bass. Notice here how RD reaches its peak *after* the downbeat, as it is caused not by a gradual acceleration process in the previous bar, as is usual in such anacrustic passages, but by the surprisingly early entry of the bass note.

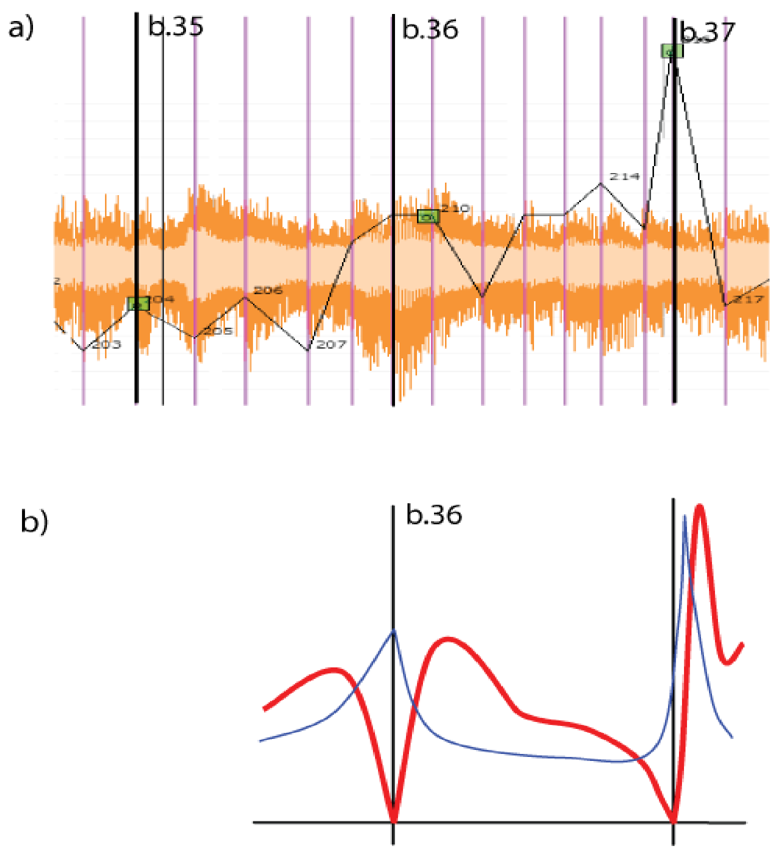

Figure 3.11 Bouncing ball graph of Shura Cherkassky’s performance of bars 35-36 (the same music as bars 3-4) of Chopin’s Prelude No.17 in A♭ major. (*Media Example 3.4* SV video capture of Figure 3.11a).

Going back to Katsaris's performance (Figures 3.8 and 3.9), bar 4 is a case where the performance parameters are not fully in phase with the expressive potential of the music, which would demand decrease in both tempo and dynamics throughout most of the bar. Decrease in both these parameters occurs but only very briefly for only one eighth-note. After that, we have a gradual process of tempo increase, which encourages increase of RD and adds to the forward moving character of the passage. Dynamics partly reinforce this forward moving character of the bar and partly the reverse process: while the inner accompanimental figurations are played with a slight crescendo increasing MT, the melodic line, in agreement with the 9-8 suspension, is played with a decrescendo, decreasing MT. The overall effect, after these conflicting values are added up, is that of a decrease of MT during most of the first half of the bar after which tension rises and joins forces with the RD increase to prepare the arrival of the new downbeat (see Figure 3.9).

3.3 Gestural motion

The bouncing ball analogy I elaborated in the previous section aims at providing a means of describing musical motion in a more "concrete" way, revealing at the same time the connection between musical and physical movement. While the bouncing ball movement can easily be created in imagination, it cannot so easily be created as an animation or graphed as motion graphs; as an analytical tool, the bouncing ball can be more practically useful if implemented as a computer program that can allow one to create these bouncing ball animations relatively easily. I describe this computer program idea in more detail in chapter 6, along with its pedagogical significance. Here, having explained my understanding of expressive musical movement in terms of physical movement, I will continue and describe this movement in a different way, focusing more on its overall effect and character as dynamic goal-directed flow of energy. From a practical point of view, this different, but related, analytical system will have a number of advantages that will become apparent as I proceed.

I will call this goal-directed flow of energy "**Musical Momentum**" and graphically represent it using curved lines and arrows as shown in Figure 3.12. I understand Musical Momentum as the experienced sum of the three components of musical motion I described above—RD, MT and GD; one can think of it as the unit of measurement of the overall experience of musical motion. In Figure 3.12 I graphically represent a generic motion cycle using four different Musical Momentum processes, or expressive gestures. "**Increase**" (**IN**) and "**Anacrusis**" (**AN**) have a forward-driving (i.e. goal-driving) orientation and "**Metacrusis**" (**ME**) and "**Decrease**" (**DE**) have a backward driving (i.e. goal-dissipating) orientation. The difference between the two gestures in each pair is that the ones that point towards beginning accents (graphically represented by vertical straight lines) are significantly more goal-directed—Anacrusis moving towards a new expected accent and Metacrusis moving away from a beginning accent (hence the arrows in the representations of ME and AN).[220] One other difference is that ME and AN are always found at the beginning and end of each motion cycle respectively (making possible the articulation of cycle beginnings), while IN and DE can exchange places in the inner part of a cycle. As the figure suggests, these expressive gestures can come in different strengths: the higher the arrow of an AN or ME the stronger its Musical Momentum or forward/backward driving force respectively. Notice how AN, for example, can also be shown with a downward-pointing arrow, representing a gestural process, which, despite having an overall decrease in Musical Momentum, has a forward-driving orientation due to its forward pointing GD. The reverse applies to ME. In the case of inner gestures, an upward directed curve/line of whatever angle will always represent increase of Musical Momentum (IN) and a downward directed one will represent decrease in Musical Momentum (DE). In addition to a variation in strength, gestures can vary in length: some can be shorter or longer than others. A fifth kind of musical gesture could have been included in the diagram of Figure 3.12, that of "**Stasis**", describing the experience of a static effect, one where no change in Musical Momentum takes place. But since this gestural type is rare in the kind of literature I consider here, I chose to leave it out.

[220] The use of the expressions "forward-" and "backward-driving" to describe the experience of musical flow is obviously metaphorical; they take their meaning from the corresponding feeling of the experience of physical movement, more specifically movement towards and away from some goal moment or impact point. Consider for example the two phases of the physical experience of throwing a ball: the first involves moving the hand forward with an accelerating motion until the moment when the ball is released and the hand suddenly changes direction; the second phase involves the return of the hand in its initial position closer to the body, while its speed and tension is gradually decreased. Regardless of these expressions, which refer to the character of the experience of gestural process, the experience of the passage of time in general is always ahead-moving, in the sense of every new moment or new "now" in the experience of time is ahead of each previous one in the conceptual time line. For more on the conceptualisation of time in terms of spatial-movement metaphors see Johnson, *The Meaning of the Body*, especially pp. 27-31 and Lakoff and Johnson, *Philosophy in the Flesh*, chapter 10.

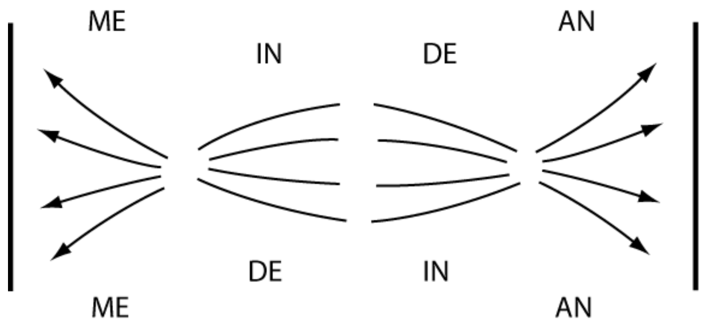

Figure 3.12 Graphic representation of a generic motion cycle in terms of Musical Momentum processes.

A gestural motion analysis of Cyprien Katsaris's performance of the opening bars of the Chopin Prelude we saw above in Figure 3.8 appears in Figure 3.13. It's another way of graphically representing what was shown in Figure 3.9 by means of the bouncing ball motion graphs. The first step is always the consideration of the expressive potential of the compositional structure, something I already discussed above. As I will explain in more detail in chapter 4, this is done both by studying the musical score and by imagining how these note structures encourage one to perform the music, trying (as much as it is possible) not impose one's own personal interpretation on the performance. Then the tempo and dynamic graphs are studied, along with hearing the actual sound recording, to determine the experienced expressive movement, here described by means of the gestural arrow graphic representation. As can be seen in the graph of Figure 3.13, each of the five different motion cycles (one two-bar and four one-bar ones) begins and ends with a Metacrusis and Anacrusis respectively since these are the processes that make possible (by articulating) beginning accents. The arrangement of the inner gestures is more flexible and can take different possible orderings. Starting from the beginning, recall how the piece begins with a gradual increase in both tempo and intensity, encouraging an analogous increase in both RD and MT. Apart from the very brief and weak opening ME, the combination of these two processes results in an experience of increase of Musical Momentum during the first bar, as the ascending curved line suggests in this graph (an AN gesture). Even though the experience of this momentum increase does build up expectation of some future goal, this expectation is very vague: as this is only the very beginning of the piece, there are no clues to suggest when exactly this goal might come. In fact, as we soon realise, this ascending process was never meant to move anacrustically into some beginning goal moment but is part of an IN-DE pattern that shapes the internal part of a two-bar motion cycle. After the change in the direction of Musical Momentum, Goal Direction during the DE motion phase begins to gradually emerge as result of the symmetrical arrangement of this IN-DE process, which sets up expectation of completion at a specific moment. As MT and RD decrease, GD, therefore, increases gradually, shaping a weak anacrustic process that will announce the end of the previous pattern and the beginning of some new idea. (It's obvious that in moving from IN to AN one cannot point to any precise moment where this shift takes place; what matters is the gradual increase of the forward-directed feeling as we approach an expected motion cycle beginning.)

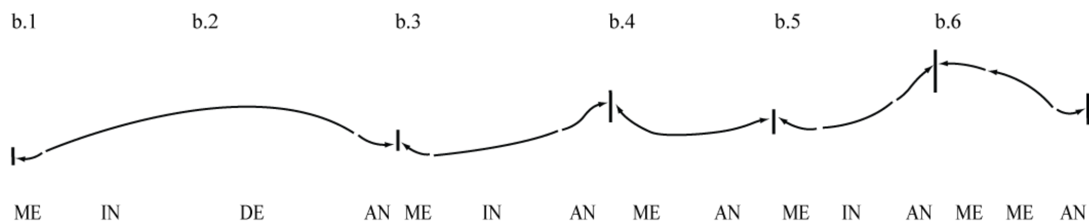

Figure 3.13 Gestural motion analysis of Cyprien Katsaris's performance of bars 1-6 of Chopin's Prelude No.17 in A♭ major (showing five motion cycles: one two-bar and four one-bar cycles).

As we have seen, a new idea begins in bar 3, as expected. As the height, size and direction of the anacrustic arrow at the end of the first motion cycle suggests, the approach of the second cycle beginning is relatively weak compared to the ones that are about to come next. (Strong Anacruses and Metacruses are represented with arrows that not only point higher up but also lie relatively higher on the vertical scale). This is due not only to the low goal expectation of the beginning of the second motion cycle but also to the decrease of momentum up to the very last moment in the second bar. About equally weak are also the two Metacruses that begin the first and third bars. For a Metacrusis to be strong, a relatively accented note is required (either through dynamic stress or by some other means). If succeeded by decrease in RD and MT, as the prototypical motion cycle shown in Figure 3.5 would, then this Metacrusis has more time to allow full release of the energy of the beginning attack moment or accent. The first Metacrusis cannot last for too long since the opening chord is too weak and is immediately succeeded by a tempo and dynamic increase. The one in bar 3 is slightly stronger since it occurs during a typical tempo delay (at the beginning of a motion cycle) before a momentum increase prepares for a new cycle beginning.

Unlike bar 1, the momentum increase that has begun early in bar 3 blends gradually into an even stronger and more goal-directed process that anacrustically leads into the following downbeat. Even though the accelerando and crescendo at this point is about the same as that of bar 1, the stronger Goal Direction, resulting from a variety of structural features (melodic, rhythmic, harmonic etc.), shapes a well-articulated Anacrusis, as discussed above in relation to the bouncing ball motion. The expressive detail at the end of bar 3, also discussed above, where a tempo delay decreases the edginess of the following accent, is graphically represented here by the more downward direction of the tip of the anacrustic arrow. The "roundness" of the experienced accent, as a result of this tempo delay, is also visually captured by the more rounded space outlined by the converging processes of Anacrusis and Metacrusis at that point.

Experienced beginning accents are thus shaped and defined by these processes that prepare and leave them. Unlike traditional definitions, which distinguish between different kinds of accents based on their structural cause (i.e. metric, dynamic, rhythmic, structural, etc), this more dynamic definition recognised only one kind of accent, which could have an endless variety of different dynamic profiles.[221] Accent as defined here, which could be any motion cycle beginning at any possible structural level, is all-inclusive, combining elements of metre, rhythm as well as of expression. At the tactus level, beginning cycle accents will usually show a strong regular (or metric) organisation, while at other levels, they may show more irregular construction.[222]

Consider the opening two bars again, which work together to shape one unified symmetrical motion cycle. While traditional metric theory would want to impose a metrical accent on the downbeat of bar 2, I do not include such an accent here since no accentuation is articulated either by the note structures or Katsaris's performance. Similarly, lower-level articulations (or motion cycle beginnings) are not confined within a strict definition of metrical structure (i.e. a regular succession of strong and weak beats) but go with the flow of the particular expressive movement. Thus, the last melody note of each repetition of the main motivic idea of the piece can articulate weak beats of *different* motional character. Two of these are shown in Figure 3.13. The first, which can be seen in bar 4 (the A in the middle of the bar), affords, as we saw above, a "double"

[221] See the relevant discussion about traditional definition of accents in the previous chapter. For a more detailed discussion of the character of experienced musical accents or motion cycle beginning see chapter 5.
[222] My idea here of a flexible definition of metre aligns closely with Hasty's idea of "meter as rhythm". See Hasty, *Meter as Rhythm*.

meaning, since it is controlled both by the metacrustic gesture that precedes it (recall the 9-8 suspension and the decrescendo in the melodic line) and by the anacrustic gesture that follows (shaped by the accelerando and crescendo in the inner accompanimental figures). The overlap of these two competing and opposing forces shapes a mid-bar articulation of a more neutral character. This is graphically represented by showing no articulation at that point but a smooth passing from Metacrusis to Anacrusis. Compare this with the next occurrence of this motivic idea, where a lower-level cycle articulation is shown in the graph (bar 6) by a secondary metacrustic arrow (one that does not point towards the bar-level motion beginning but towards a lower-level one). In contrast to the compositional structure of bar 4, the one of bar 6 involves a change of harmony on the last melody note, in addition to a rising melodic line instead of a descending suspension. This discourages performers from letting Musical Momentum drop metacrustically immediately after the downbeat of bar 6 but instead encourages them to postpone it until after the middle of the bar. This is achieved by not letting the dynamic level drop until after the middle of the bar. See how this is represented in the motion graph by the almost horizontal direction of the first metacrustic arrow.

In just the very first six bars of the prelude we've seen a variety of motion-cycle shapes, each with a very different distribution of Musical Momentum and therefore a very different expressive effect. I will classify them into four main types based on the way momentum is distributed within them (see Figure 3.14). The crescendo/decrescendo signs here represent overall increase and decrease of Musical Momentum). In the first bar of the prelude, we encountered the second type, where the strength of motion cycle beginning accents (and by consequence that of ME and AN) tend to be weakened to give way to an internal gradual tensing (IN) phase balanced by a relaxing (DE) one. In contrast to this, the first type (seen in bar 4, and which I consider as the prototypical one) involves only one change in MM since motion phases group with their related ones, the ones with the same directionality: ME with DE and IN with AN. An important difference between the first two types of motion cycles is the fact that their energy climax occurs at different points, something that gives them a different expressive effect. The energy climax of the second type occurs in the middle of the cycle and does not involve any attack or goal moment arrival; after momentum reaches its highest point, it then changes direction without leaving any traces of articulated accent behind it. This emphasis in the inner part of the cycle and the inversion of the direction of momentum of the prototypical motion type results in a weakening of the motion phases responsible for articulating motion cycle beginnings—that is, AN and ME (recall the discussion of the weak accents of the first two bars of the prelude). In the first type, however, the two related motion phases join forces to articulate strong beginning accents. The reason I consider this as the prototypical motion cycle type is because of the way its momentum distribution is similar to that experienced by the regular and identical series of beats (see Figure 3.5 above), and because, being simpler, more well-balanced and economical in its momentum organisation, it results in a simpler, more natural movement.

These first two motion cycle types can be thought of as representing what Doğantan has identified as the two models of rhythmic movement proposed by theorists of the 19th century: the model of upbeat-accent-afterbeat and the model of repose-action-repose.[223] While the origins of both of these models were understood in terms of bodily phenomena, they were nevertheless kept distinct from each other: the first, which included the idea of accent, was thought of as applicable more to small rhythmic groups and was conceptualised in terms of movements such as the rapid hand movement; while the second, which did not include the concept of accent, was more applicable to global rhythmic phenomena and was conceptualised in terms of the breathing in and out cycle. While these two models do complement each other in some ways by describing rhythmic phenomena at different levels of structure they cannot easily integrate with each other. This is what my model proposed in Figure 3.12 achieves, where the flexible definition of a rhythmic unit (motion cycle) can take a variety of shapes (four of which are shown in Figure 3.14) at different levels of structure. At the same time, as discussed at the end of the previous chapter in relation to the GTTM, it manages to integrate elements of meter and rhythm (accent and grouping) as well as of tonal motion and perception (tension and release) and performance expression.

[223] See Doğantan, "The body behind the music".

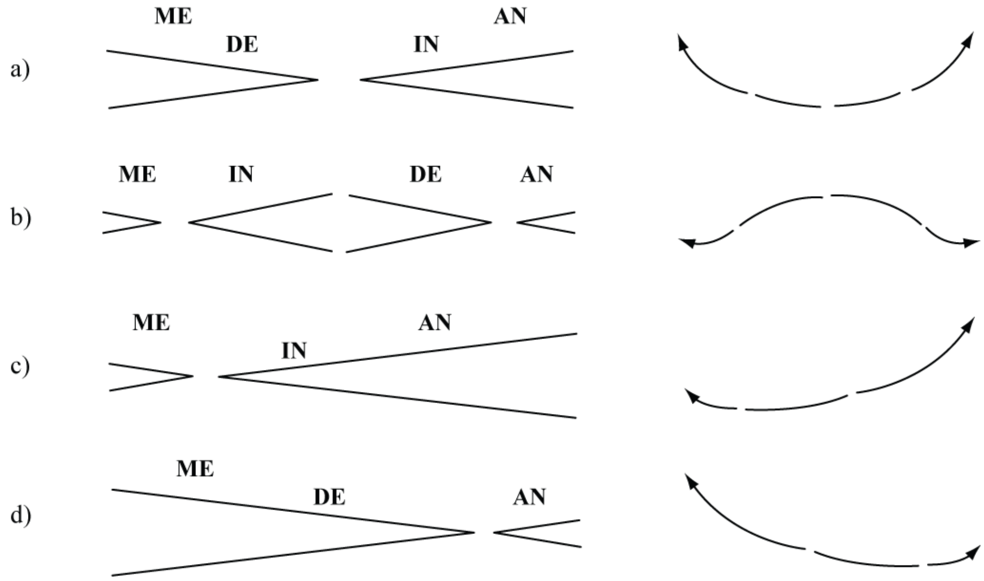

Figure 3.14 Motion cycle types.

While the first two types shown in Figure 3.14 are symmetrical, the remaining two are asymmetrical: the third emphasises a forward-directed process pointing towards the following motion cycle beginning (see bars 3 and 5 of the Chopin Prelude), while the fourth emphasises the reverse process, the motion away from a relatively strong motion cycle beginning (see bar 6). It is very common to see these two motion-cycle types occur together in succession, the one balancing the other. A strong anacrustic process that directs its energy on a strong accent will normally be followed by a relatively strong Metacrusis, necessary in order to allow for a release of this energy. This is the case with bars 5 and 6, but also with bars 3 and 4—even though Metacrusis in the second case is shortened to allow for a stronger anacrustic arrival on the following beginning. Similarly, a weak Anacrusis, as at the end of bar 2, will naturally be followed by a weak Metacrusis, which is the case with the downbeat of bar 3. What I mean by referring to a more "natural" succession of motion phases is one that does not involve sudden momentum level changes. A weak Anacrusis, for example, followed by a strong Metacrusis, will have a surprise effect since the weak AN will set up expectations for a weak beginning accent, while the strong ME will involve a sudden strong beginning accent (this is the case with Cherkassky's aggressive articulation of the beginning of bar 36 as discussed above in relation to Figure 3.11). Conversely, a strong Anacrusis followed by a weak Metacrusis will involve a weak beginning accent that will have a surprising effect (although of a different nature) due to the non-fulfilment of the expectation of a strong accent.[224]

In the examples we saw above, there was an agreement between the expressive potential determined by the compositional structure and the overall experienced gestural content. Katsaris played mostly with the expressive potential of the music and shaped well-balanced patterns of gestural motions. Alfred Cortot, by contrast, is a famous example of a pianist with a very idiosyncratic style of playing, which can be partly explained by the way he tends to play against the expressive potential of music. Figures 3.15 and 3.16 show how he chooses to shape various occurrences of the main motivic idea of the Chopin Prelude. As the dotted lines in the motion graphs indicate, three of these motives (bars 5-7, 35-37 and 37-39) are shaped at the two-bar level as one long metacrustic motion, going against their expressive potential, which suggested an AN-ME symmetrical pattern. The way he achieves that is by shifting the energy climax to the beginning of each motivic pattern (instead of the middle) by means of both dynamics and timing. The overall tempo/dynamic pattern for the whole two-bar motive is a decrescendo combined with an accelerando. This particular combination creates the following effect: at the beginning of the motive an accentuation of the second quaver combined with a local tempo drop creates a stretching feeling whose tension gradually resolves as the dynamic level gradually decreases and the tempo increases. While a more typical decrease of momentum process involves decrease in both of these performance parameters, the specific combination is also quite frequent. (This effect is analogous to the experience of watching a small marble ball bounce on the ground until it stops. In the beginning, it bounces higher up, with stronger force, every longer periods of time and gradually its height and strength decrease while its cycle frequency increases. The general effect, however, is one of decrease of the overall energy or momentum.)

[224] I will discuss more about such "special" expressive effects at the end of chapter 5.

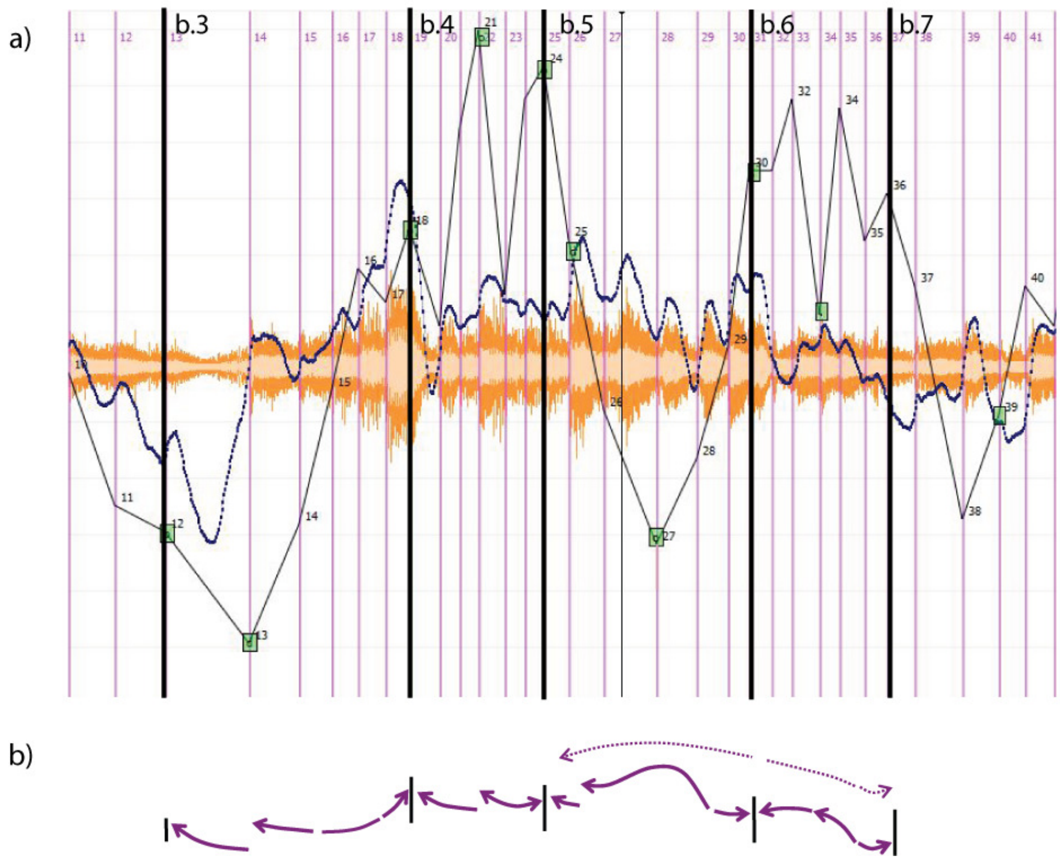

Figure 3.15 Chopin's Prelude No.17, bars 3-6 performed by Alfred Cortot. a) Tempo and dynamic graphs; b) motion graph. (*Media Example 3.5* SV video capture of Figure 3.15a).

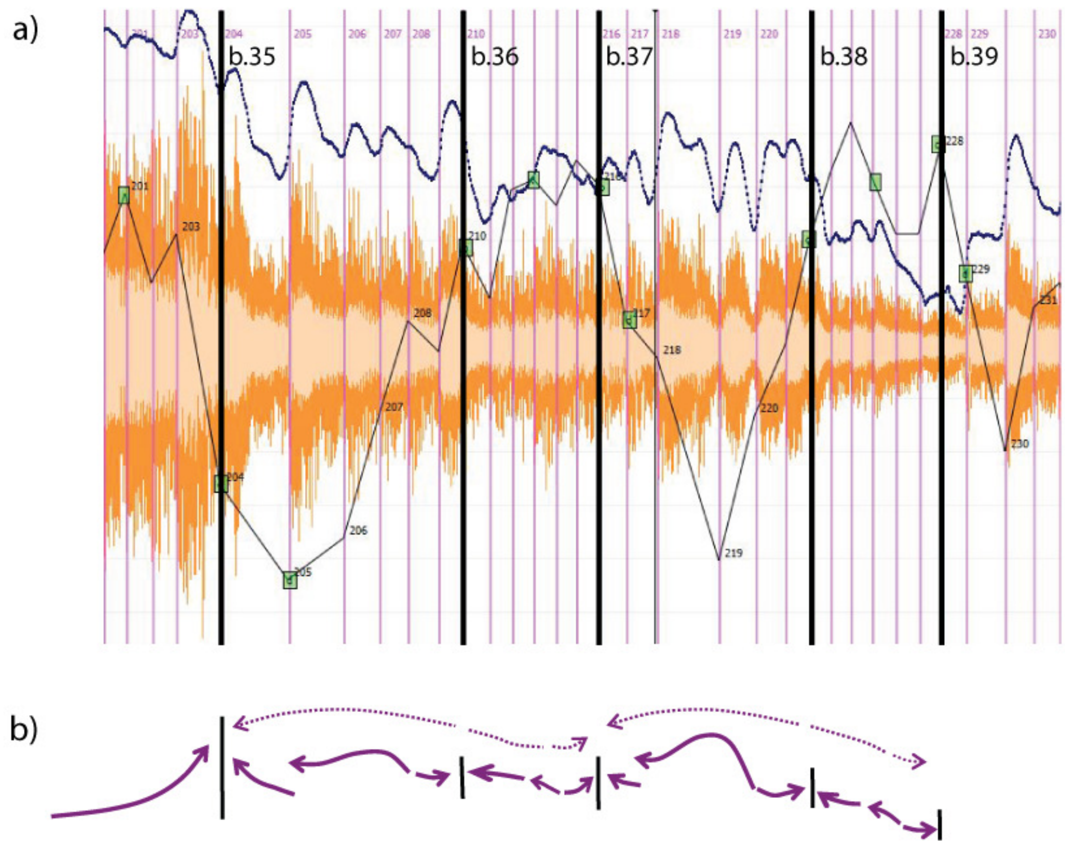

Figure 3.16 Chopin's Prelude No.17, bars 35-38 performed by Alfred Cortot. a) Tempo graph and waveform; b) motion graph. (*Media Example 3.6* SV video capture of Figure 3.16a).

In order to go against the expressive potential of this motivic idea and refocus its energy climax, Cortot had to use a lot of energy. One can easily hear this by sensing how Cortot throws himself on the first melodic note of each motivic phrase. The dynamic accent on this note—the second quaver note of the first bar of each motivic phrase—creates a syncopated or displaced metacrustic effect right after the main Metacrusis that appeared on the downbeat (see bars 3 and 5 in Figure 3.13 and bars 35 and 37 in Fig. 3.16). Momentum has hardly begun to decrease after the first Metacrusis on the downbeat when a second Metacrusis renews and prolongs the tension for a bit longer before allowing this descending relaxation process to complete. As the motion graphs of Figures 3.15 and 3.16 show, this can happen in different ways: the second metacrustic accent (a lower-level accent) can have different degrees of relative strength, indicated graphically by the relative vertical position of the beginning of the pointed arrow. Compare for example the syncopated Metacrusis at the beginning of bar 3 with that of bar 5. In the latter, the syncopated accent renews the tension level from a higher point than the one on the downbeat right before it. (The same pattern occurs when the same music recurs in bars 35-38). One explanation for this different treatment of the two motives is the fact that bar 3, the very beginning of the large-scale phrase of bars 3-10, and the first in the whole piece, occurs too early to have more extreme syncopated structures. By the second motivic occurrence in bar 5, however, this is more justified by the overall rise in momentum, dynamic level and melodic line. In contrast to this, during the second half of each motivic phrase, the lower-level Metacrusis tends to either maintain the overall tension level the same, as in bar 4, or occur within an overall decrease of momentum, as in bars 6, 36 and 38 (as was the case also with Katsaris's performance). This comes as no surprise since these lower-level accents articulate the very last note of the motivic phrases, bringing closure to the whole phrase. Note how the wave lines of these lower-level metacruses join with the previous ones in a way that creates no significant disjunction in the momentum flow but only a surface articulation. By contrast, the disjunction caused by the lower-level displaced metacruses during the first half of the motivic phrases, which is graphically represented by a gap in the wave-line flow, is an indication of the unexpected occurrences of these accented moments.

Thus, Cortot's performance of the Prelude involves, in addition to going against the expressive potential of the music, several surface musical motion disjunctions. These disjunctions can be visualised not only in the motion graphs presented here but also experienced in time by hearing the piece. Motion cycles that deviate significantly from the prototypical one result in greater experienced inner conflicts. This experience can be likened to that of running, not on a treadmill, however, where movement cycles are very regular, but outside in the woods where the path is full of ups and downs and unpredictable turns. If we compare the two performances, we can immediately see from the graphs that Katsaris's performance is much more conflict free as the limited number of momentum flow disjunctions and lower-level, inner-motion accentuations suggest.

In addition to the momentum flow in the inside of a motion cycle, beginnings of motions can have different degrees of smoothness, too. Since this will be explored in more detail in chapter 5, I will only give a brief preview of this issue in relation to the visual aspect of the motion graphic system. Only a quick glance at the beginning accents of bars 4 and 6 of the motion graph of Figure 3.13 is needed to tell the difference in their expressive character. The way a beginning accent is approached and left is very important in shaping its expressive effect. The beginning accent of bar 4 appears to have a more edgy character as indicated by the more pointed shape of the AN-ME wave-lines converging at that point. By contrast, the wave-lines converging on the beginning of bar

6 show minimum amount of edginess. This edginess is shaped not only by the performance parameters (in the case of bar 4, the steeper increase-decrease patterns in both tempo and dynamics) but also by the compositional structure (the upward leap from the melodic G to B♭ in bar 4 compared to a descending step in bar 6).

While, however, the accent of bar 4 is more "edgy" the one of bar 6 is more "intense". This is mainly because of the delay of its decrease after the accent. Notice how tempo and dynamics do not decrease right after the downbeat of bar 6 as is the case with that of bar 4, which is a more typical kind of Metacrusis. This does not allow momentum to decrease immediately after the accent but keeps it tense for a while. This is especially pronounced in the secondary Metacruses of bars 5 and 37, where momentum seems to be increasing for a moment before it starts to decrease (notice how the wave-lines of these metacruses have an upward bent in their inner part). This phenomenon, which I will refer to as the "**metacrustic stretch**", is particularly characteristic in Cortot's performance (although we also saw it in Katsaris's performance in bar 6). This increase in momentum is different from an IN motion phase in that it is subsumed by and experienced as part of an overarching metacrustic process. In other words, while MT and RD increase for some time during the beginning of this metacrustic process, the strength of goal-dissipation is great enough not to allow this increasing process to take a forward goal character.

Similarly, while a typical Metacrusis involves decrease in all three components of musical motion (RD, MT and GD) after the accent, a typical Anacrusis involves the reverse process. There will be times, however, when anacrustic charge will be present even when there is a pronounced decrease in both MT and RD. This is quite typical at the end of large-scale phrases that fade out through decrease in both dynamics and tempo. An example is given in Figure 3.17, the end of the first large period of the Prelude occurring in bars 17-18. Here, while the decrease in both performance parameters seems to be shaping a phrase ending that will complete itself during the decrease of momentum phase of the ongoing motion cycle, other structural factors will direct the end of this phrase towards a new cycle beginning. The specific contour and rhythmic pattern of the final motivic phrase (with the descending third line and the melodic anticipation on the penultimate note) will shift the balance to the right and land on the final note anacrustically. Thus, what we have here is a very weak Anacrusis, as the downward direction of the anacrustic arrow in the motion graph indicates. The distinction between phrases that end within the same motion cycle and those that end on the beginning of a new one is an important one. At the more conceptual theoretical level, this can be thought of as a non-alignment of phrase structure and motion cycle structure.

Experientially, as seen here, this concerns the particular character and shape of motion cycles.

Finally, I would like to say a word about the influence of the compositional structure on Cortot's performance of the Chopin prelude. The expressive potential inherent in the compositional structure of a piece of music, which influences the performer's interpretation, is not always unambiguously structured but can contain conflicting processes within itself. While the main motivic phrase of the Prelude we saw above seems to favour an overall AN-ME pattern, certain structural aspects of the piece can encourage alternative readings. Thus, Cortot's performance, which goes against this general anacrustic drive of the motive, seems to be sensitive to other more subsidiary structural forces. The accent on the second quaver of the first bar of each motivic phrase is justified, for example, by the fact that, as the first note of the melodic phrase after a wide melodic leap, it naturally receives some amount of accentuation. In addition, a two-bar phrase, like the main motive we consider here, falls more naturally within a hypermetric structure where the first bar is accented and the second unaccented. Therefore, a metacrustic process for the whole two-bar group is more in agreement with this metric scheme, rather than an AN-ME one, which places the strong accent in the middle of the phrase. Moreover, as the music progresses, Cortot reacts to other structural aspects of the piece. In the recapitulation in bar 35 (Figure 3.16), such a two-bar metacrustic pattern is even more justified by the fact that the music that leads up to the return builds up a huge anacrustic motion which demands a strong arrival at this point. The downbeat of bar 35, which is both dynamically stressed and metrically accented, serves more naturally as the beginning of a metacrustic motion pattern rather than as anything else. The first motivic occurrence of this motive in bar 3, by comparison, coming from a very weak introductory figuration, cannot be supported strongly enough for such a metacrustic profile. This is evident in Cortot's performance shown in Figure 3.15, where the syncopated accent of bar 3 cannot be strong enough to shape a higher level-ME for both bars as in the following three instances we saw.

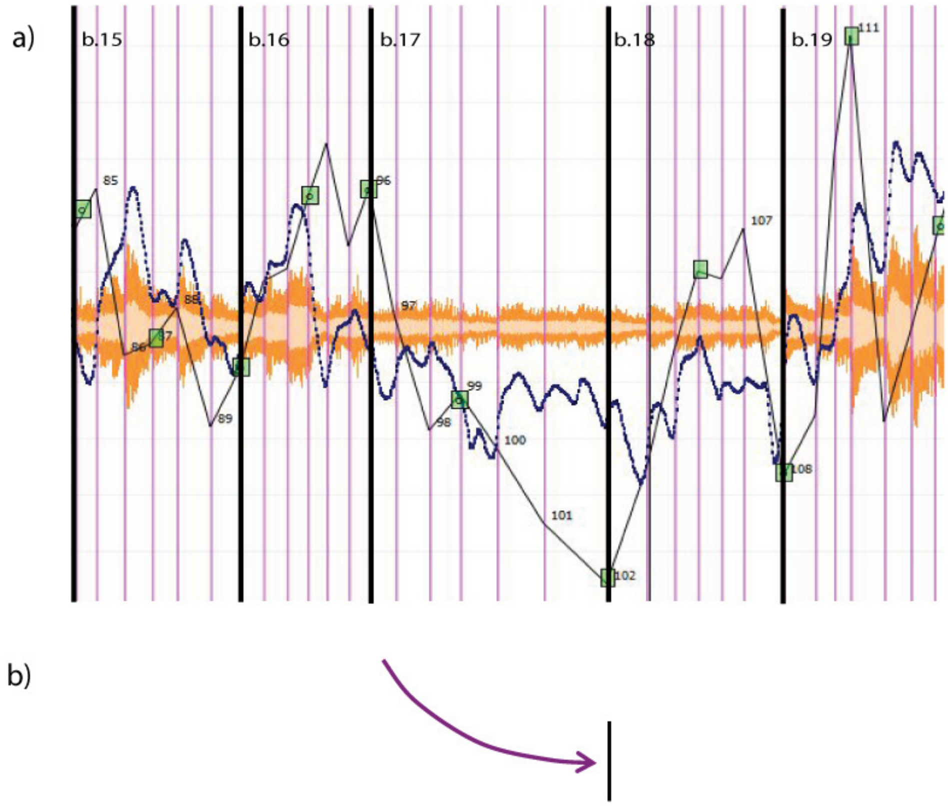

Figure 3.17 Chopin's Prelude No.17, bars 15-19 performed by Alfred Cortot. a) Tempo and dynamic graphs; b) motion graph. (*Media Example 3.7* SV video capture of Figure 3.17a).

CHAPTER FOUR

Musical Structure and Experience

4.1 Musical structure and experience

In the previous chapter, I tried to suggest how one could understand expressivity in music as the more bodily component of musical experience. The two related analytical notations I proposed aim at guiding one to explore the relation between musical and physical movement. The structural properties of the sounds we hear as music encourage us to "move" to the music in different ways, involving either literal physical and/or imaginary movement. In this chapter, I will make use of these analytical languages in order to talk in more detail about the expressive meaning of musical structure as experienced movement.

Musical structure, a term used all the time in music theoretical discourse, can mean different things to different people. Having already dealt with many issues of conceptualising and graphically representing musical structure, and since structure will be the main topic of this (as well as the following) chapter, I find it necessary, at this point, to begin with a clarification of a few things about its various meanings in relation to the different ways one can experience or engage with music. Depending on whether one's interest comes from the point of view of a performer, listener, theorist, psychologist or even physicist, or whether one is interested in the physical, syntactical or motional properties of music, one's conceptualisation of structure will differ. Figure 4.1 makes some important distinctions among different kinds of structures, which will make the understanding of my arguments more clear.

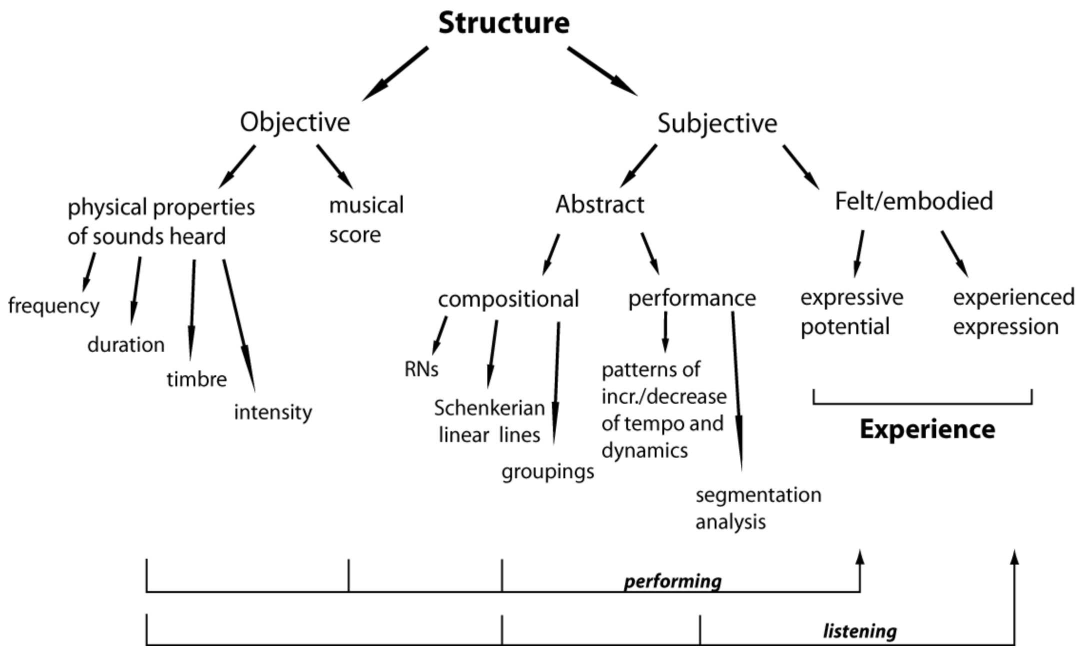

Figure 4.1 Distinctions among different kinds of structures.

The most obvious distinction is that between what I will refer to as *objective* and *subjective* structures. By *objective* structure I mean the representation of the musical properties that do not take their meaning from the music user's[225] creative engagement with the music. Musical structure in this sense can mean the objective representation of the physical properties of the musical sounds (such as frequency, intensity and timbre) as they change over time (this category includes graphs such as the ones I used in the previous chapter in order to analyse performance structure: the tempo and dynamic graphs as well as the wave form of the sound file); or the properties of the notes as they appear in the musical score, which serve as instructions for realising the music in performance.

Once the sounds are perceived, or the musical score performed, studied or interpreted in its context, *subjective* structures emerge that can be either of an *abstract* or *felt* (*embodied*) kind. This distinction, which is of crucial importance in the present study, separates structural patterns that are made out of abstract musical objects or properties such as pitches, harmonies, intervals or intensity levels, and those made out of rhythmic, gestural or motional processes experienced with the whole body. (It was upon this distinction that the discussion of different traditional analytical methods was based

[225] Here I use Mark Reybrouck's term "user" as a broad category of subjects that deal with music by means of different traditional music behaviours such as listening, performing, improvising and composing. See Reybrouck, "Body, Mind and music".

in chapter 2.) Essentially, abstract structures are representations of meaningful structural relations of the objective structures. Felt structures are representations of our experience of music as movement or gestural process. I further divide the first (abstract) category into the *compositional* and the *performance* structures: the first involves the organisation of musical objects drawn directly or indirectly from the musical score (such as Roman Numerals, Schenkerian linear lines and phrase or other groupings of various elements) and the second forms patterns from objects drawn directly from tempo and dynamic graphs (the way the notes are preformed) extracted from recordings: these could include more abstract kinds of patterns of increase and decrease of intensity and tempo etc. (the tempo pattern segmentation kind of analysis that I will use below under "performance structure" is one such example). Felt structures, as already introduced in the previous chapter, are descriptions or graphical representations of either the way performers react to the inherent expressiveness of the compositional structure of music ("expressive potential") or the way listeners experience music as movement(the kind of analytical representations I proposed—either the "voice-feeling" and "emotivic" kinds of analyses as introduced in chapter 2, or the "bouncing ball" and "gestural arrow" analyses I introduced in chapter 3).

Since the goal in this chapter is to explore the link between objective/abstract musical structure (or simply "structure" as is commonly understood) and the experience of gestural movement (musical expression), in what follows, I will attempt to discover how various abstract structural patterns contribute to shaping musical motion or expressive movement (what I defined here as "felt structure"). These contributions will be considered both in isolation and as they interact with each other. The claim is that specific structural patterns contribute in specific ways towards shaping the overall musical motion. Even though the discussion below might give the impression that I am presenting a rule system to be used for producing musical motion graphs, its function is of a very different nature. These mappings of abstract structure onto felt experience are the outcome of my own personal interaction with structure—the way I experience musical structure as expressive movement. Their aim is therefore not to suggest how others should or would experience structure but to encourage or direct the attention of analysts to an important aspect of experience not normally discussed. It can be thought of as a guide to those who wish to experience the motional content of music in a more conscious and systematic way. The specific analytical process that achieves this does not only encourage more bodily involvement but also enriches this experience by raising it to a more conscious, rational level of thought. The theoretical insights to be presented should therefore be judged not so much by how scientifically valid they might appear but by how well they achieve what they aim at. To do so, the readers will be asked to experience themselves each musical example and see how well the proposed analytical insights capture their own experience. Moreover, the reader should keep in mind that since most of the examples I consider here and in the other chapters are piano works, it is inevitable that my observations on the mapping of structure to felt experience are specific to this instrument, although one would expect that most of them would apply to the music of other instruments as well.

The contribution of abstract structure will be divided into that of the compositional and the performance structure. This division can be explained by the fact that I am interested in not only the listeners' experience but also the composers' as well as the performers'. What the composer has provided in a written score is rather precise instructions of *what* notes to play at roughly what time. What has not been specified is *how* exactly to play these notes—their precise loudness, timing and articulation. These are supplied by the performer during performance or the score reader while imagining the sound. In either case, the compositional structure as it appears in the musical score is a major influencing factor in shaping the realised sound structure. The expressive potential inherent in the compositional structure, as we saw in the previous chapter, encourages performers to play the notes in a certain way. Having confronted the musical score and the expressive potential, performers shape the expression of the final performance music as they wish (theoretically, I understand this process as the reshaping of the expressive potential into the final experienced musical motion). That's for the performing process. For listeners, this distinction between compositional and performance structure, or between expressive potential and actual experienced expressive movement, is not important: listeners just hear the structure of musical sound and experience it as movement. Nevertheless, the same structural factors that shape the expressive potential contribute also (together with the performance structure) to the expressive effect experienced by the listener. (The contributing factors relating to the performing and listening experience are shown at the bottom of Figure 4.1).

4.2 Compositional Structure and Expressive Potential

I will first deal with the contribution of the compositional structure, which I will theorise in relation to the expressive potential. While the expressive potential can also be understood as an inherent property of the compositional structure, I chose to theoretically understand and graphically represent it as a "felt" structure from the point of the performer (or anyone who imagines the notes performed): it is the result of the interaction of the performers' bodily processes (psychological, sensorimotor, etc) as they attempt to realise the structure of the score in sound. When doing so, therefore, performers inevitably input their own personal interpretational choices. In order to separate out only the influence of the compositional structure, the performer's own contribution will need to be suppressed: when attempting below, therefore, to reflect on the contribution of the compositional structure, I will be playing or imagining the notes of the score performed by avoiding (as much as it is possible) imposing my own interpretational choices on the music but instead reacting only to the structure of notes. What this means is that one can think of the expressive potential in terms of an actual interpretation of a piece where the performer has passively reacted to the expressive potential of the compositional structure of the music, without imposing his/her own interpretation. One can therefore understand my graphs below as such "passive" interpretations, whether of all of the structural aspects of a piece or of isolated structural dimensions.

The physiology and psychology of the mind-body is such as to instil in the music user the disposition to organise, whenever possible, the musical events into cycles of motion of equal length. This explains our preference for metrical music and our tendency to tap our foot to the regular beat of music. When faced with a piece such as Mozart's A major Piano Sonata K.331 (the theme from its first movement, already visited in chapter 2, is shown again in Figure 4.2), performers trained in the western classical tradition know immediately that the music has been structured by the composer in such a way as to satisfy this preference for metrical music. This cannot only be seen in the way the notes are notated in the musical score (from the time signature to the way the notes are grouped together) but can also be experienced physically, once the notes of the score begin to be performed. As performers play these notes, they seem to drive their mind-body into regularly recurring dotted-quarter motion cycles.

Figure 4.2 The theme from Mozart's A major piano sonata K.331, first movement, bars 1-18.

The most decisive factor in shaping the boundaries of motion cycles at this level of structure is the change of harmony or chordal inversion every half a bar. This rate of change is consistent for the first three bars (I-I^6-V^6-V^4_3-vi^7-V^6-I), after which a rate increase helps to highlight the arrival of the cadence. The beginnings of these motion cycles are further reinforced by the pitch changes in both the melody and bass lines (see the leaps of an ascending third in both the melody and bass in approaching the second dotted-crotchet of bars 1 and 2 beat and those of a descending fourth in approaching bars 2 and 3.) The parallel movement of the outer lines in the first three bars, strengthens these beginning accents even more. The structural aspects just described are, however, only responsible for the articulation of the beginnings of these experienced motion cycles. The musical events that occur within these structural groups are the ones that shape the particular character of each motion cycle.

Let's first see how rhythmic patterns shape the expressive potential of music.. In order to do so I will first need to isolate various rhythmic patterns found in the Mozart theme and try to see how I react as I attempt to hear them as embodied sound. Then I will see how these rhythmic patterns interact with other factors to create the overall musical experience. My approach to the interaction of the different contributing structural factors will be one of determining how each new factor I consider reshapes all of the previous ones combined. Having looked at those factors that establish a regular metrical framework, I will now see how and to what extent durational patterns reshape this regularity. Figure 4.3a shows a representation of how one regular or well-formed motion cycle would look like. At 4.3b, I show what happens when the different durational patterns found in the Mozart theme are experienced in relation to this established regular motion cycle series. Given that short-long durational patterns have a forward moving or anacrustic quality, the first two of the three rhythmic patterns shown here are located in the music in alignment with the notated metrical groupings. Even though the dotted crotchet level of motion cycles is retained, the dynamic of the inner part of each motion cycle is modified as shown in the motion graph of Figure 4.3b. Upon hearing the short note(s), I experience a lower-level cycle beginning articulated by a lower-level Anacrusis. The result of the experience of this lower-level competing motion cycle beginning (shown with a vertical dotted line) is the weakening of the Anacrusis leading to the higher-level motion cycle beginning (represented by the lowering of the angle of the tip of the anacrustic/metacrusis arrows), which translates into a weakening of the force by which the following musical accent is approached. The third rhythmic pattern shown in Figure 4.3 is not aligned with the dotted crotchet motion cycles with the result that we have an emphasis on the third quaver beat of each of the first two bars of the music (similar patterns occur later in the music as well).

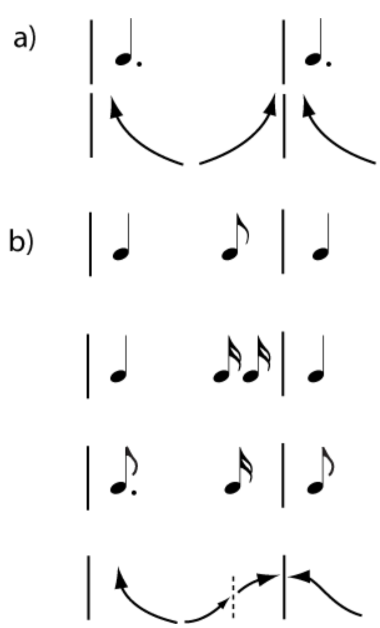

Figure 4.3 (a) A "well-formed", prototypical motion cycle; (b) a reshaped motion cycle as a result of short-long (anacrustic) rhythmic patterns.

In the above example, the rhythmic patterns were considered within an already established metric framework. When heard in isolation, without any additional factors involved, a durational pattern such as the above, a succession of short and long notes, is still experienced with the short notes moving anacrustically to the long notes. Their strength, however, is relatively low, with the result that once other influencing factors come into play, the dynamic of the gestural patterns involved can change significantly to the point where their meaning can be completely reversed. This is demonstrated in Figure 4.4. Starting with just an isolated short-long rhythmic pattern, I show how other different factors can interact to shape motion cycles whose dynamic orientation can range from an Anacrusis from the short to the long note (Figure 4.4a) to the complete opposite, a Metacrusis from the short to the long. For the sake of simplicity, consider dynamics as the only other interacting factor, where at 4.4a the second longer note is louder, gradually becoming softer as we approach example 4.4e, while the first shorter note gradually becoming louder. As we move away from 4.4a and 4.4e, we begin to see emphases (see the dotted vertical lines at b, c and d) that compete with the higher-level, stronger motion cycle beginnings. In the middle example (Figure 4.4c) we see a situation where the factors involved balance each other resulting in an ambiguous situation where there is no clear motion cycle beginning at the dotted quarter-note level; while the durational short-long pattern favours the long note for a cycle beginning, dynamics shift the balance in about equal amount towards the left short note.

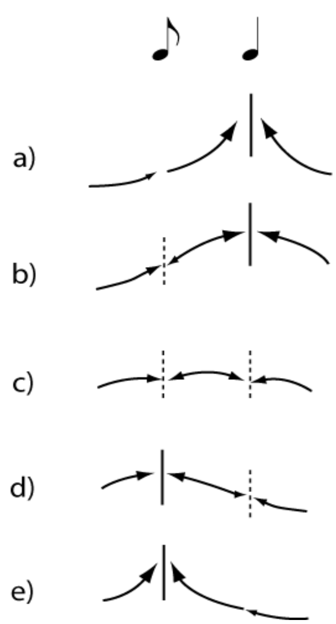

Figure 4.4 Interaction between different structural factors and the reshaping of motion patterns.

In the above examples I only considered the contribution of durational patterns and of the groupings due to changes of harmony/pitch. However, more factors are in effect in the compositional structure of this piece. In the following examples, I will consider more aspects of pitch structure: melodic or voice-leading motion, root motion and the sensory-acoustic quality of chords. While durational patterns are more crucial in articulating lower-level motion-cycle beginnings by mostly controlling rhythmic drive, pitch structure seems to be responsible mostly for shaping MT within motion cycles. Before I consider how these factors interact with the rest, I will first examine them in isolation.

Imagine a succession of isochronous and identical musical sounds. This results in the experience of identical motion cycles at the note level. Although nothing in the structure itself suggests any particular grouping of these stimuli at the higher level, these will most likely tend to group into twos due to a general preference of humans for duple organisation (as some of our body's most basic functions work, such as heart beating and walking). In the presence of pitch changes, higher-level processes emerge: ascending melodic lines encourage increase of musical tension, resulting in a higher-level process of Musical Momentum increase (see Figure 4.5a); the reverse process takes place with descending melodic lines (Figure 4.5b). The larger the interval the more tension increase or decrease will be encouraged (Figures 4.5c and d). In addition, larger intervals encourage stronger beginning-motion articulations (notice the stronger lower-level anacruses corresponding to these stronger articulations). [226]

[226] According to Graybill, "We tend to associate an ascending motion with an increase of energy or intensity and a descending motion with a decrease—an association that undoubtedly arises from the experience of singing. In other words, tonal space is not a neutral vacuum but rather a dynamic field in which a motion up is qualitatively different from a motion down." See Graybill, "Towards a pedagogy of gestural rhythm", p.6.

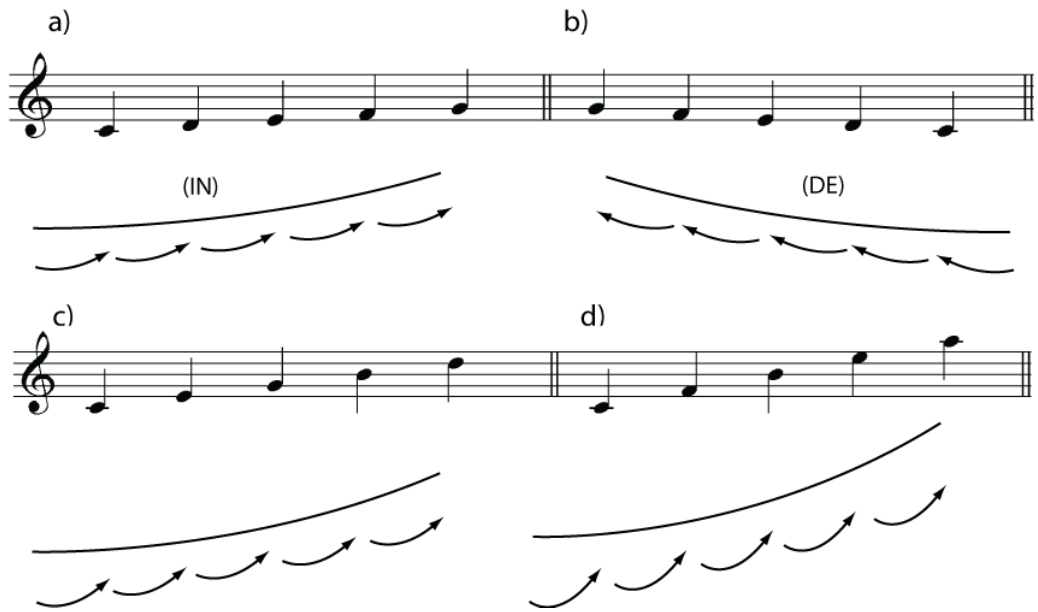

Figure 4.5 Contribution of melodic direction and size. (a) Ascending melodic line; (b) descending melodic line; (c)-(d) melodic leap size.

In Figure 4.6, I apply these observations to the melodic line of Mozart's theme. I start out with just the melody notes (leaving out the neighbour notes in order to concentrate on the broader melodic shape) out of context and try to experience them. In terms of MT alone I experience something like what is represented in Figure 4.6a. When I hear even closer, I begin to observe various other gestural details. Figure 4.6b marks the moments where I experience emphases due to the ascending leaps of a third. In contrast to descending leaps, ascending ones seem to have the power to direct the gestural flow more strongly than descending leaps. Other more subsidiary emphases are shown at c and d, induced by parallel melodic grouping associations: the descending sequential pattern of ascending thirds C♯-E and B-D and A-(B-)C♯ and, overlapping with these, the descending sequential patterns of descending fourths. (Naturally, the first event in each group receives some amount of emphasis.) Adding up all of the above observations yields something like the gestural patterns shown at 4.6e. Following the overall tension pattern of 4.6a and the stronger emphases of b and d, we have gestural patterns that converge at the goal moments shown here, which contradict those of the established metrical framework we saw above.

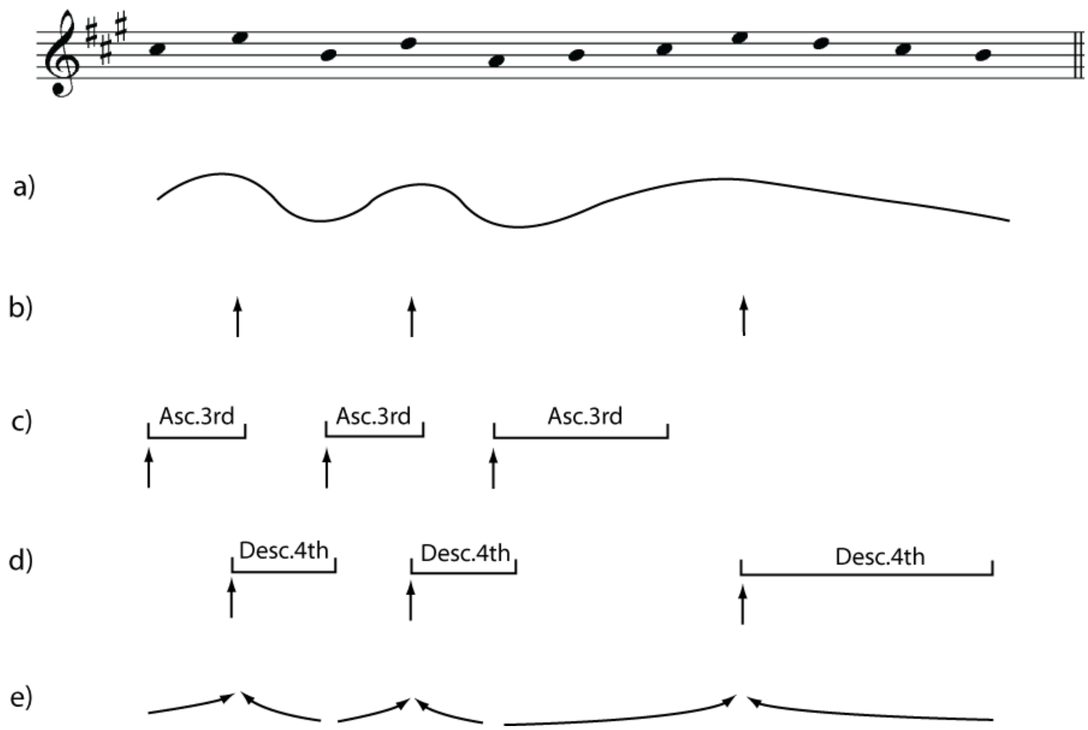

Figure 4.6 Contribution of the melodic line of Mozart's theme in isolation.

If we consider the established metrical framework as well (Figure 4.7a), which is quite strong and not easily overturned, as well as the inherent stability (sensory/acoustic tension) of the chords that support the melodic line, the resulting motion patterns will look as in Figure 4.7c. At 4.7b I show how the motion patterns of 4.7a are reshaped given the tension patterns induced by the melodic line and chordal tension. The tension pattern of the overall melodic shape was considered above (4.6a). Chord tension will need a bit of explanation. As I play each vertical chord without any repetition or rhythmic pattern, I notice that the chords that support the second half of each of the first two bars feel more tense that those in the first half. This can be explained by the fact that the chords at the second halves are in inverted position, which renders them more unstable and therefore more tense. In addition, other factors that make these chords more unstable are the presence of sevenths, as in bar 2, and a less stable chord note in the soprano line (in the first bar, for example, the E in the top part of the second chord, being the fifth of the A major chord, is more unstable than the C♯, which is the third of the chord). Chordal tension of the two chords in the third bar is about equal: a root position F♯ minor chord with the third in the top line and a seventh in an inner voice sounds moderately tense. Similarly, the following E major chord is moderately destabilised by its first inversion position and the fifth in the top voice. As in the first two bars, chord tension in the fourth bar seems to be higher in its inner part, with the focal, most unstable point the 6/4 chord on the second dotted crotchet beat. What we see is that chord tension is in phase with the tension due to the melodic shape and both together reinforce each other to drastically change the tension patterns of the prototypical motions of 4.7a. At 4.7c I also include the contribution of the emphases due to the ascending leaps and intervallic associations we saw above in Figure 4.6. Since the gestural patterns of 4.6e were not too strong, in the context of the metrical framework, they are experienced as secondary or lower-level motion cycle beginnings.

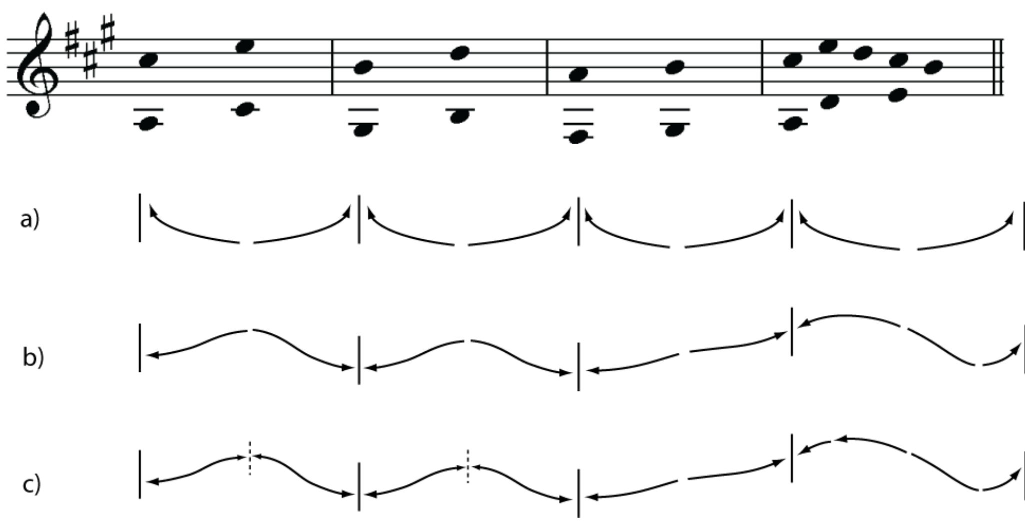

Figure 4.7 Expressive potential of the melodic direction, the chordal sensory/acoustic tension and the established metrical framework of Mozart's theme.

I will now complete the discussion of the contribution of pitch structure with the consideration of harmonic motion. Traditional harmonic theories describe different harmonic progressions as having their own unique character or function: some have a cadential effect resolving tonal tension and others have a more passing, tensing or other function; some explanations give more emphasis on root motion and others on voice-leading; some consider its basis to be the scale and others the chord. In addition, many explanations, in one way or another, suggest ways these progressions have an experienced character that can be understood in relation to our physical experience in space-time—speaking of tension and release, forces of attraction and repulsion, various kinds of movement etc. My explanation of harmonic function below will combine various elements of traditional harmonic theories and integrate them within the general framework of the experience of gestural movement.

Root motion is widely acceptable as being very important in the experience of harmonic movement. I will begin by exploring the effect that root motion has on the experience of MT and rhythmic drive. In order to do so, I will need to isolate the element of root motion by coming up with simple, and inevitably abstract and artificial, chord progressions. My guess is that root motion moving in ascending or descending seconds has a different character than that of thirds or fifths, for example. This can be easily confirmed by playing a series of triads on the piano and hearing their effect. When moving in parallel motion on a diatonic scale, first inversion triads moving in ascending seconds increase MT while those moving in descending seconds decrease MT (Figure 4.8). This is because all of the voices ascend or descend respectively. The principle in effect here is the one we saw above in relation to melodic direction and size. Due to the fact, however, that this chord succession is moving on a diatonic scale, not all voice-leading connections are of the same size—some are whole and some are half steps—with the result that not all triads are equally stable—some are minor, some major and some diminished. Thus, while the general process of musical motion is that of increase of musical tension, the increase in each succession is slightly different.

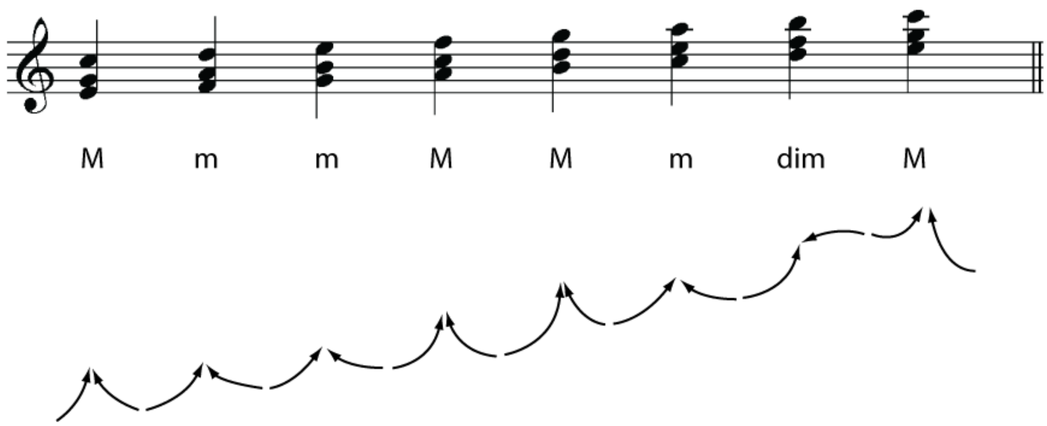

Figure 4.8 Diatonic stepwise ascending succession of first inversion triads.

In determining the precise musical motion patterns (in this case mainly due to MT patterns) encouraged by this chord succession, one needs to consider both those factors that shape the experience of the approach (Anacrusis) of each chord attack, and those that shape their leaving (Metacrusis). Let’s first consider the contribution of triadic quality. After repeated hearings and comparison of the effect of the four chord qualities shown in Figure 4.9, I conclude that the minor triad encourages the weakest anacrustic motion, followed by the major triad, the diminished and lastly by the augmented triad. (Each of these anacrustic motions can be thought of as the experience of moving from silence to chordal sound, the gestural strength of which is retrospectively determined as soon as we hear that sound.) This must be because the minor triad has a more neutral and less bright character than the major one, while the diminished and the augmented ones are relatively more dissonant and have a more striking chord quality. The experience of Metacrusis after their attack goes as follows: the major triad, being the most stable of all, encourages the strongest Metacrusis (i.e. the greatest tension release); the minor triad follows, encouraging a weaker Metacrusis due to its less stable character; the diminished triad is even more unstable, keeping tension high during the weak metacrustic phase; the augmented triad is the most dissonant or unstable with the weakest Metacrusis. Compare the angles of the metacruses of the diminished and augmented triads, the first demanding resolution to a more stable chord within a large-scale decrease of momentum (or Metacrusis) and the second demanding resolution to a more stable chord anacrustically (see Figures 4.10 a and b). If the chords of resolution are not the ones normally expected but those shown in Figures 4.10c and d, then the diminished triad can resolve anacrustically and the augmented triad metacrustically to more stable chords.

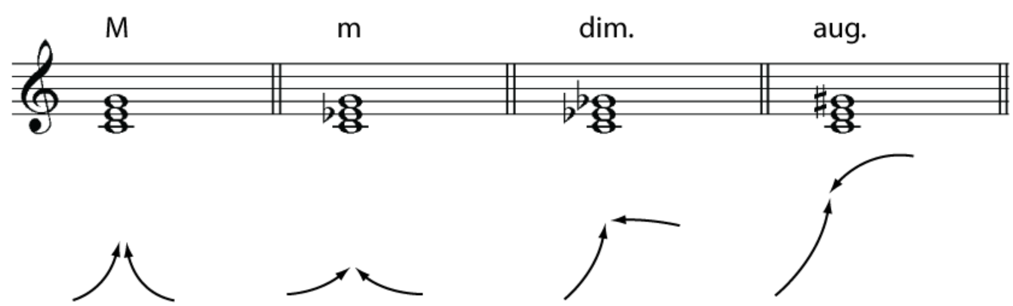

Figure 4.9 The experience of the approach and leaving of triad qualities.

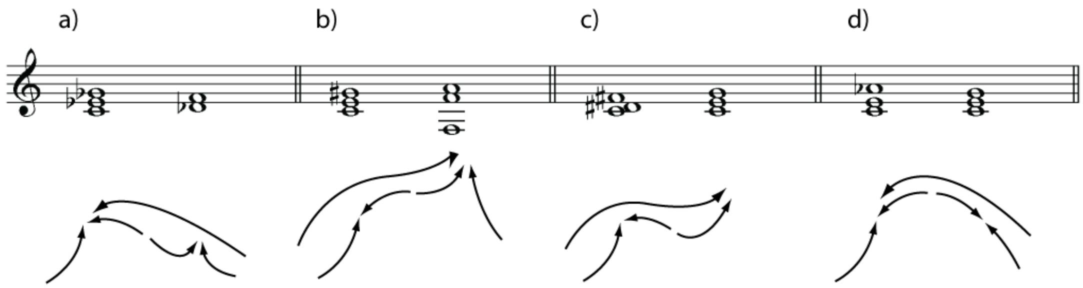

Figure 4.10 Resolutions of diminished and augmented triads.

In addition to the chord quality, one also needs to consider the voice-leading between two successive chords. As mentioned above, the voice-leading of the chord succession of Figure 4.8 is either ascending a whole or half step. Due to its smaller size, it appears that half step motion encourages less tension increase than whole step motion, although, depending on which voice it occurs in, the amount it contributes varies: bass motion is generally considered as having more weight followed by the soprano and then by the inner voices. Thus, the least tension increase in the progression of Figure 4.8 is expected to occur from the first to the second and from the fifth to the sixth chords, due to the half step bass motion but also the fact that they move to minor chords (see the motion graph of Figure 4.8—compare the height of the tip of the arrows at the attack points of each successive pair of chords). The most tension increase should occur from the fourth to the fifth chords where all voices move by whole step between two stable major triads, and in approaching the dissonant diminished chord. Carefully hearing and bodily experiencing these chord progressions agrees with these observations.

The last chord progression, from a diminished to a major triad, stands out due to the delay of the release of tension, something that eventually gives it a more cadential effect. The tritone of the diminished triad weakens the Metacrusis after its attack, transferring the tension forward with a strong Anacrusis towards the final major triad. In addition, the presence of a half step moving to the root of a stable major triad increases goal direction, something that gives an even greater cadential effect to the progression. The progression with the next greatest cadential effect is the one from the third to the fourth chord. This is because of the motion to a stable major triad and a double half-step motion, one of which occurs in the soprano resolving to the root of the chord. The fact that the first of these two chords is a minor chord and not a diminished one gives it a less cadential character than the last chord succession. The increased goal direction and cadential effect in the last chord succession is nothing but our familiar tonal closure, the cadence to the tonic or the gravitation of tonal motion to the stable tonic.

The distinctions between the character of each chord succession in Figure 4.8 was admittedly not great enough that can easily be experienced on first hearing.[227] The factors discussed, however, are quite significant, and when joined together with other ones (rhythmic, metric, performance, etc) can create larger, more pronounced and easily heard motion patterns. Moreover, parallel progressions such as this one do not occur very often in common practice tonal music. Most progressions involve more complex voice-leading with both ascending and descending motions of not only steps but also leaps of various sizes. I will consider some of the most commonly used tonal chord progressions below. Keep in mind that in trying to experience the gestural content at the very lowest level of structure of these chord successions, I am taking into account an element of retrospection, so that the Anacruses into the following chords depend not only on the previous chord but also on what is about to come. In experiential terms this means that as soon as I hear a chord, my expectation of what was about to come takes a definite shape. In the case of a musician reading or performing a score (which is mainly how I consider these progressions below) this expectation is largely shaped by the predictions I make based on what I see in the musical score.

In Figure 4.11a, I have the most basic chord progression in tonal music (I-IV-V-I) with mostly stepwise voice-leading in the top voices and leaps in the bass. Unlike the chord progression we saw above, not all voices here move in the same direction, making things more complex in determining tension patterns. The first two chords present a straightforward case where a stable major triad is succeeded by a slightly less stable major triad with root a fourth higher. The Anacrusis leading into the second chord (see the lower graph) is quite strong and that can be explained by the ascending melodic motion in all (but the top, which moves in oblique motion) voices. Of particular importance is the bass motion that ascends with a perfect fourth. The leap to the F in the bass not only strengthens the Anacrusis to the second chord but also helps to stabilise this second chord due to the fact that it is a stable interval. Even though, being in root position, the F major triad is quite stable, its stability is somehow weakened by the presence of the fifth in the soprano and the fact that in the overall tonal context it is built

[227] Our careful experiencing of these chord progressions was nevertheless a good exercise in sensitising our body-minds to the motional aspect of musical structure, something that is one of the main goals of the method proposed.

on the fourth scale degree. It is for that reason that the Metacrusis experienced after this chord does not release tension fully, as represented by the angle of the arrow.

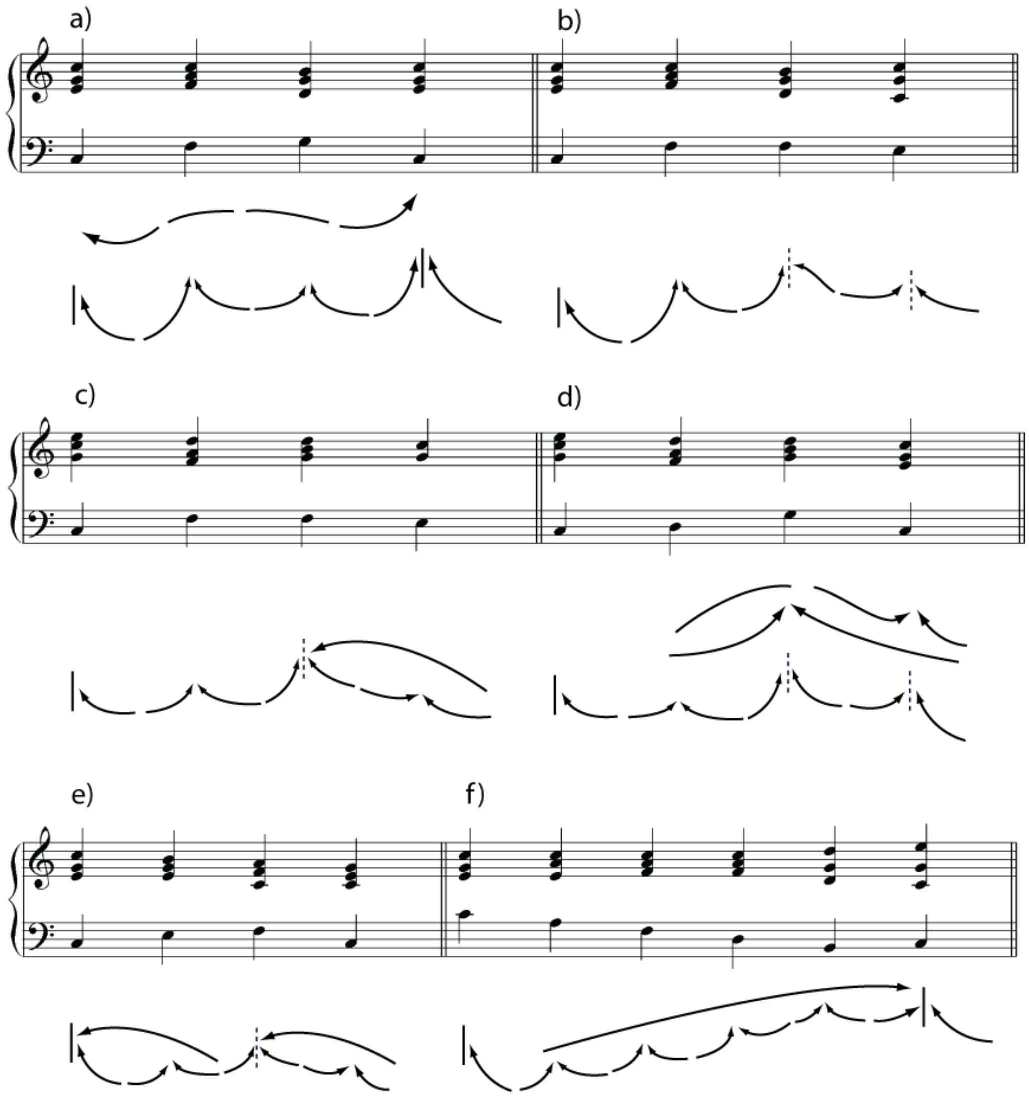

Figure 4.11 The motional experience of commonly used tonal chord progressions.

Even though the next chord succession (IV-V) of 4.11a proceeds with an ascending bass motion between two root position triads, the descending voice-leading in the top three voices encourages a minor large-scale decrease of tension (as indicated graphically by the relatively lower height of the tip of the arrows that converge on the attack of the G chord as compared with those of the previous chord). In approaching the last chord, we experience a quite strong Anacrusis encouraged by the ascending voice-leading in the top voices and the leap in the lowest voice. What makes this final Anacrusis even more striking is its increased goal direction encouraged by the ascending half-step motion in the soprano, which in the C major tonal context acts as a leading-tone gravitating to the stable tonic. Full closure and tension release occur with the final root position tonic chord and the first scale degree in the soprano. The top motion graph here shows how this whole progression is experienced as a single motion cycle.

Modifying the final cadence of this same chord progression as shown in Figure 4.11b affects its closural effect. What basically changes is the bass motion in the last two chords, adding a seventh to the dominant, which resolves in the bass to the third of the tonic triad. As the motion graph suggests, the addition of this seventh strengthens the Anacrusis approaching this chord by increasing musical tension, and at the same time weakens the approach to the final chord. The descending bass combined with the resolution of the seventh down to the third of the tonic triad encourages a large-scale decrease of tension in these last two chords and a weakening of the cadence. (Compare the converging arrows on the final chords of Figures 4.11a and b, which represent both the strength of the cadence and the degree of its closure).

Strong cadences such as the one of Figure 4.11a, which are approached by strong Anacruses, encourage the experience of higher-level motion beginnings. In the first progression here, this grouping is indicated by the vertical lines and clarified further by the higher-level motion structure shown. At 4.11b, the weakening of the final authentic cadence makes such higher-level groupings more ambiguous. The increased strength of the Anacrusis approaching the dominant and the decreased strength of the Anacrusis approaching the tonic create an ambivalent situation where two competing higher-level groupings are experienced about equally as shown by the two dotted vertical lines. Compare this chord progression with that of Figure 4.11c, where the removal of the leading tone-tonic motion in the top voice weakens further the Anacrusis approaching the tonic and creates a less ambivalent situation favouring the dominant chord as a higher-level motion beginning.

As in Figure 4.11b, the final cadence (V-I) of Figure 4.11d is also flirting between Anacrusis and Metacrusis. Some factors favour higher-level Anacrusis pointing to the tonic, while other factors tilt the balance towards the left, favouring a metacrustic relationship between the two chords (see the two different graphs on the top). The experience of this ambiguity, however, is not a matter of *either* the one interpretation *or* the other, as these alternative readings might suggest. These lines were only shown here in order to point out the two competing forces involved. At any given hearing, both of these “alternative” interpretations are in effect at the same time creating an ambiguous metrical experience. The two vertical dotted lines shown, represent competing barlines in our metrical experience. These metrical downbeats can come in different strengths and character depending on the specific strength and character of the anacruses and metacruses that prepare and leave them.[228]

While progressions with root motion of an ascending fourth can relate in a range from Anacrusis to Metacrusis, as the previous examples demonstrated, descending fourths most commonly relate metacrustically. The IV-I cadence in Figure 4.11e provides the most common example of this root motion, where most voices descend, decreasing the overall musical tension. While in a V-I motion, the leading-note-to-tonic motion helps strengthen Anacrusis to the tonic, here we have the reverse, a 4-3 scale-degree motion acting as a dissipating goal-directed motion, shaping a metacrustic gesture at the two-chord level. Likewise, in the I-iii succession at the beginning of this progression, the half-step descending motion in the top voice helps to shape a comparable metacrustic gesture. Even though the bass ascends in the progression, the motion to a relatively weak minor-mode mediant decreases the power of the local Anacrusis, encouraging an overall decrease of tension at the two-chord level. Thus the two chord successions I-iii and IV-I are shown in the graph as having comparable motional character (see the two overarching metacruses here).

The I-vi succession at the beginning of the progression in Figure 4.11f is also comparable in character to the I-iii we've just seen. The descending bass and the motion from a major to a minor mode shape an overall decrease of musical tension. The following progression, on the other hand, has the reverse character. It has the reverse voice-leading to the I-iii succession, contributing, therefore, with an increase of musical tension. A higher-level process of increase of tension continues until the end of the progression: first, through a tense seventh supertonic chord; then through an unstable first inversion dominant chord and an ascending melodic motion in the soprano (that weighs a lot, after a series of repeated Cs); and, finally, through an "up-lifting" authentic cadence with ascending parallel motion in the outer voices.

Having considered how different structural aspects shape the expressive potential of music mostly in isolation, I will complete the discussion of how all of these factors work together in Mozart's theme from the A major Piano Sonata (see Figure 4.12). Each of

[228] Recall the discussion on "ambiguity" in chapter 2, and how in traditional theory and analysis it is normally understood and represented in terms of alternative readings. As I noted, however, alternative readings may suggest different hearings or interpretations of the structure of the piece rather than conflicting readings within a single hearing and interpretation, which is how I understand "ambiguity" (or more accurately perhaps "ambivalence") here.

these factors contributes to the overall experience in a different degree, which is hard (and if not impossible, then beyond the purpose of this study) to quantify. In summing up these contributions, one would need to use one's ears or bodily/intuitive judgment, which is part of the point of this analytical method. The way to do this, as I explained earlier in this chapter, is to try to imagine how the notes of the score would be performed, trying (as much as it is possible) not to impose one's own personal interpretation or be influenced by previous hearings of the piece but let mainly the structure of the notes shape the music.

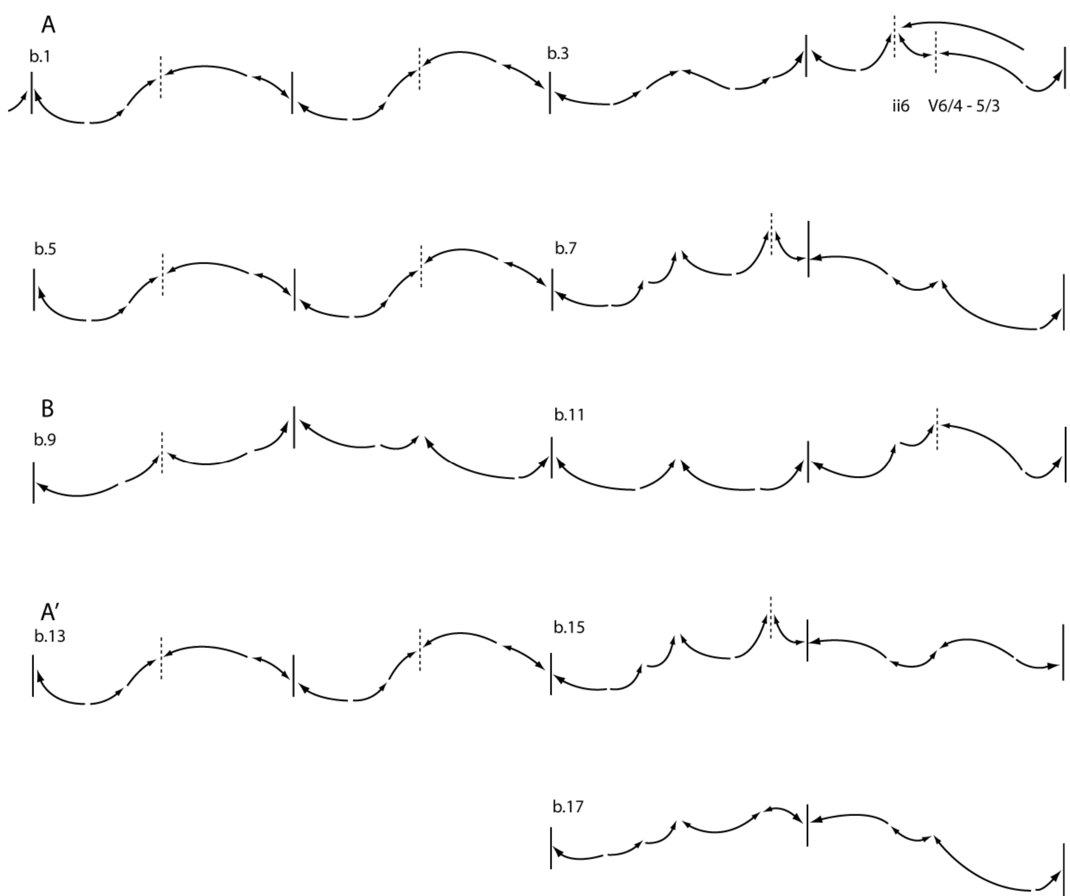

Figure 4.12 Expressive potential of the theme from Mozart's A major piano sonata, first movement.

Before I comment on some interesting features of this analysis, I would like to briefly remind the reader of how expressive gestures are notated in these graphs. In any given bar of this graph several structural levels are normally merged into what looks like one level. Figure 4.13b separates out the three levels implied in the first bar of the graph of Figure 4.12 (also shown in 4.13a). Recall that each motion cycle begins and ends with a Metacrusis and Anacrusis respectively and may or may not include Increase and/or Decrease phases in its inner part (although the latter part of a Metacrusis and the first part of an Anacrusis can be thought of as Decrease and Increase phases respectively). Thus, at the bar level, all of the inner gestures shape an IN-DE pattern (see top graph of Figure 4.13b). The dotted vertical line is there to suggest the location of a strongly salient focal moment (or strongly competing barline/downbeat), notated more clearly in the middle graph of 4.13b. Finally, where in the hybrid graph there is an Anacrusis or Metacrusis that does not point to a vertical line (solid or dotted), as is the case with the one corresponding to the third and sixth quaver beats in the bar, a lower-level motion beginning is implied, as clarified in the lowest graph of Figure 4.13b.

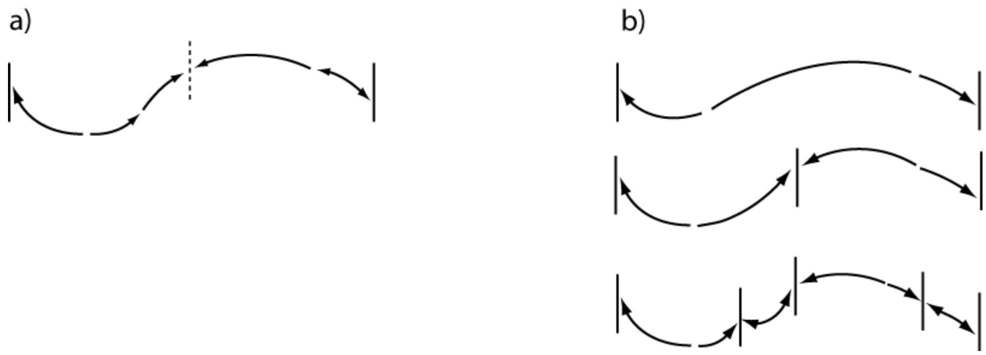

Figure 4.13 Representation of multiple levels in a single motion graph.

All of the structural levels shown in Figure 4.13 exist in our experience at the same time and, and their gestural influence on performers will be analogous to the importance of the hierarchical level. The more passively a performer reacts to the structure of the notes as suggested by the above graph, the more his/her performance will result in an interpretation whose motional content will look like this graph. Performers are, however, free to react to each structural aspect in different ways and raise less salient features to a higher level of structure or relegate more salient ones to a lower level. This is demonstrated in Figure 4.14, which shows how the expressive potential of the first bar of the Mozart theme can be modified at will by a performer. The salience of the inner-bar motion beginnings, for example, can be minimised through the use of specific tempo-dynamic shadings during performance to shape an overall experience as represented in

Figure 4.14a.[229] The gestures that converge on the competing motion beginning (dotted vertical barline) in Figure 4.13a are neutralised here in order to shape a more unambiguous bar-level motion structure aligned with the notated meter. Alternatively, a performer could react positively to this competing barline by strengthening it as shown in Figure 4.14b. Notice how the AN-ME pattern that makes this competing barline possible appears more pointed now, but also how the beginning ME of the whole bar is weaker. Such a structural reshaping could be made by a crescendo-decrescendo combined with accelerando-decelerando patterns aligned with these inner gestures. In theory (although it would be out of the interpretive practice of Mozart's music), such a reshaping could be done to such an extent, and carried further into the following bars, as to create a metrical effect of relocating the notated barline one beat later.[230]

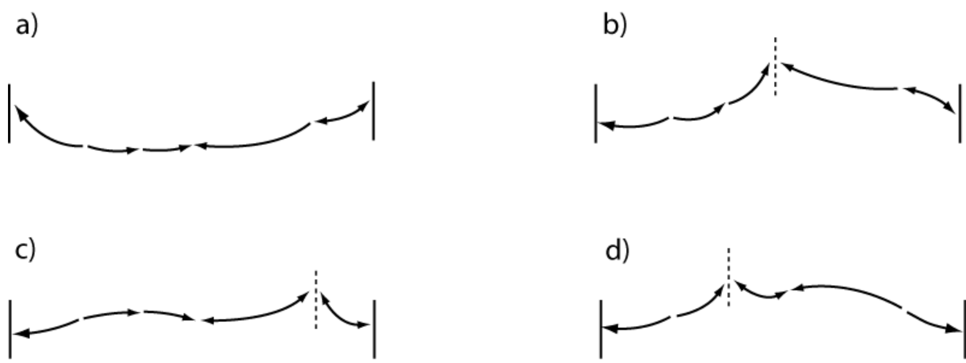

Figure 4.14 Reshaping of the expressive potential by the performer.

Similarly, a performer could choose to bring to the surface other more latent competing barlines. The interpretation shown in Figure 4.14c reacts to and strengthens the motion gesture encouraged by the descending melodic structure between the last chord of the first bar and the first of the second. This would have the effect of phrasing this last chord with the following phrase.[231] Moreover, it would tend to minimise the experienced strength of the notated barline, creating a smoother and more flowing phrase shaping. One other possibility is shown at 4.14d, where the performer creates an early

[229] The function of different tempo-dynamic shadings will be discussed in the next section and in more detail in Chapter 5.
[230] This interpretation (4.14b), which emphasises the middle of the bar, can be thought of as corresponding to a Schenkerian 5-line interpretation, while that of 4.14a to a 3-line interpretation. The one of Figure 4.13, on the other hand, is a more ambivalent situation where both the 5- and 3-line interpretation can be considered as having about equal weight in one's experience.
[231] This phrasing is favoured by the Peters Edition. See Meyer's discussion of the different phrasing options in *Explaining Music*, p.30ff.

momentum peak on what would normally be a weak sub-beat. What encourage such an interpretational choice are the short auxiliary semiquavers that lead anacrustically into the longer quavers. By emphasising these quavers, which themselves are short in relation to the longer crotchets that follow, their anacrustic charge decreases, deemphasising in turn the mid-bar latent barline (recall the discussion of the lowest rhythmic pattern of Figure 4.3b).

By showing these four interpretations in Figure 4.14 I don't mean to suggest that these are the only options available to performers but that many performance interpretations originate in the compositional structure of music. The compositional structure of music, in other words, acts as a creative constraint on performers, who are of course free to choose between more predictable interpretations or more idiosyncratic ones. My hypothesis is that the more a performer reacts to the most salient features of the compositional structure (i.e. the ones shown at higher motion structural levels in my graphs), the more "predictable" or "conservative" (not in a negative sense necessarily) their interpretations might sound. Thus the most predictable interpretation will be the one of Figure 4.12, which, as I described above, "passively" (again, not necessarily in a negative sense) reinforces the expressive potential of the compositional structure. Then the one of Figure 4.14a might be thought of as the next most predictable interpretation, which aims at reinforcing the notated metrical structure, by shaping rather balanced (prototypical) motion cycles. Other interpretations will generally aim at commenting on and highlighting more specific or less obvious aspects of structure.

Having explained a few things about the meaning of these graphs in relation to the performing process, I will proceed with a few general remarks about the overall structure of the motion graph of 4.12.The most interesting thing perhaps is the way momentum is distributed in motion cycles at different hierarchical levels to shape four-bar phrases. Immediately striking is the way the A sections are shaped differently from the B section, something expected and necessary in order to convey their different formal function. The A sections generally avoid strong AN-ME patterns on relatively strong metrical beats, something that gives them a more flowing character. The B section, by contrast, is shaped more squarely with relatively strong AN-ME patterns converging every half a bar.

We've already seen how the Anacrusis from the first to the second bar is weakened by the descending voice-leading between two chords with root motion of a descending fourth. The latent barlines—as a result of this—on the last quaver of bars 1 and 2 (see Figure 4.14c) minimise the strength of the downbeat of bars two and three, creating a smoother passing across the bars. The rise-and-fall pattern seen in each of the first two bars appears one more time in augmentation in the remaining two bars. The inability of the previous rises to reach some definite climax creates an expectation for this to occur in the second half of the phrase. When this expected climax occurs on the high E right before the cadential V^6_4, it fails one more time to satisfy the listener fully (and rightly so, since it's only the very first four bars of the theme). This climactic E is not only placed on a weak sub-beat but it is also supported by an unstable predominant. Moreover, while it fails to function as a proper climax itself, it prevents the cadential 6/4 from being the climax either. As Figure 4.12 illustrates, the approach of this cadence through a descending line, and within a general context of decrease of momentum, minimises the inherent accentuation of a $\begin{smallmatrix}6\\4\end{smallmatrix}$ - $\begin{smallmatrix}5\\3\end{smallmatrix}$ motion. Compare this half cadence with the one that closes the B section, where the motion into the cadence—a relatively strong Anacrusis—gives climactic meaning to the $\begin{smallmatrix}6\\4\end{smallmatrix}$ - $\begin{smallmatrix}5\\3\end{smallmatrix}$ motion and effectively announces the return of the opening section.

Three more V^6_4s occur in the course of the theme, each time in a different context. Even though at the end of the A section (bar 8) the V^6_4 is placed, as deserved, on a metrically strong position, the competing barline a quaver earlier absorbs all of its energy necessary to function as the goal of the 8-bar period. In addition to the descending voice-leading, the added sforzando prevents the ii6 from moving strongly (that is, with a strong anacrustic force) into the coming downbeat. Similarly, the addition of a seventh on the V of bar 8 and the mostly descending voice-leading prevent the authentic cadence from functioning as a strong cadential arrival, through a strong anacrustic dominant. Instead, this dominant is subsumed within a descending momentum process that leaves the listener wanting more.

The adventure of this cadential dominant continues further in the final phrase after another weakly approached V^6_4 (bars15-16). This time, the dominant seems to have more strength, resolving with increased anacrustic charge into a suspension chord right on what at first appears to be a cadential tonic. The upward resolution of this tonic and its placement on the very last, highly unstable sub-beat postpones the final cadence for two more bars. An even more driving ascending motion continues in the following bar, promising to become a strong Anacrusis that will bring the long awaited climax, only to deny this expectation for one more time. After a triumphal rise to a high A in the penultimate bar, a sudden melodic descent of an octave takes us back to a weak V^6_4

motion, denying the desired strong cadence (again, rightly so, since this is only the theme of a set of variations, where a big strong cadence is saved for the very end of the movement).

The fluidity of the last few bars of the theme is particularly striking as visually captured in the graph of Figure 4.12. Bar 16, an elision between an expected cadence and the two-bar extension, deserves further commentary. What's interesting here is the way the resolutions of the suspension chords are ambivalently related to what comes before and after. The unstable V^6_4 resolves to a more stable V^5_3 at a metrical position that renders it rhythmically unstable. This V^5_3 points both backwards, relating metacrustically to the previous chord as a resolution, and forwards, relating anacrustically to the following chord. Similarly, the suspended dominant chord on the second dotted crotchet beat of the bar resolves metacrustically to a stable tonic while at the same time its ascending voice-leading and metrical position destabilise it and give it forward-moving character. Since in each case both of these competing forces neutralise each other, the effect is that of smooth passing from one chord to the other.

The structure of the B section has a quite different effect. In the first two bars of this section, the figurations of the left hand articulate clear motion cycles every half a bar. The same arpeggiating pattern is then taken over by the right hand, reinforced by the chords of the left hand, which coincide with the beginnings of the resulting motion cycles. These left-hand arpeggiating patterns influence significantly the experience of the melodic line, which is a variation of the opening melody. The rhythmic complexity of this melodic line, which encouraged complex multileveled motion structures in the A section, is now smoothened out, as the graph of Figure 4.12 shows. Half-bar motion cycles, shaped symmetrically by ME-AN patterns, unambiguously dominate any other lower-level or conflicting patterns, which are omitted in the graph since their contribution to the overall experience is insignificant. Moreover, while the A sections favour descending melodic lines across barlines, here, ascending motion strengthens even more the articulation of strong motion beginnings. Climaxes, which were denied in the A sections, make their appearance here for the first time, first on the high A on the downbeat of bar 10, prepared by a rising motion in the previous bar, and then at the very end of the section as a goal motion prepared by the repetition of scale degree 5 in the top voice.

4.3 Performance Structure and Experienced Expression

In the previous section we saw how the compositional structure not only tells us what notes performers must play (and therefore what notes will sound) but also provides an influencing force in how performers shape musical expression. In this section, I am not concerned about the performing process but about its results: how a performer has played the notes and how a listener has experienced musical expression as movement. In determining the experienced expression, therefore, I will need to study, in addition to the compositional structure and its expressive potential, the performance structure, and more specifically the tempo and dynamic fluctuation graphs. Given also that every performer is very different, with different background, education, sensitivities and so on, the final expressive result will always be different. These personal influencing factors will not preoccupy me here, however, since my goal is the link between objective or abstract structures on the one hand and the expressive motion experience on the other. Since the whole of next chapter will be devoted to the analysis of performance interpretation, in this section I will limit myself in discussing some general issues regarding the contribution of performance structure in the overall musical motion experience.

I will begin with some basic remarks about the nature of the structure of performance parameters. I will leave articulation aside for now and see how one can make sense of tempo and dynamic variation, as can be studied from tempo and intensity graphs, extracted from recordings of specific piano performances of common practice tonal music. Even though one needs to study how tempo and dynamic fluctuation graphs behave in context in order to evaluate their full experiential meaning, there is some value, at least at the first stage of analytical study, in looking at them in relative isolation. In this relatively short introductory investigation of performance structure, I will therefore try to see if I can make sense of (both by looking at and bodily experiencing) different tempo and dynamic patterns, both in isolation and in context. This explains various new analytical symbols that I will be introducing below ("Z", "U" etc.), which will only be secondary in importance in the context of the more in-depth investigation of performance structure in the following chapter.

My hypothesis, based on my own personal observation, is that a pattern of increase or decrease of intensity mainly encourages increase or decrease of musical tension, the amount of which will depend on the degree of increase or decrease of these intensity patterns. To lesser degree, patterns of increase or decrease of intensity will also encourage increase or decrease in rhythmic drive. (Recall the discussion in the first section of this chapter of how a louder ball impact will cause not only a higher rebound, which corresponds to musical tension, but also higher overall speed.) Patterns of acceleration or deceleration will contribute in a similar manner: their main contribution, however, will be in encouraging analogous change in RD with only minor change in musical tension. Keep in mind here that I talk about the *contributions* of these structural parameters in the overall experience. In other words, an increase of intensity, for example, will result in increase of experienced tension only when considered in isolation. When other factors come into play, the overall experienced pattern of tension will be modified accordingly—as the sum of all of the contributing patterns involved.

Such changes of tempo and intensity can be gradual and take place over large periods of time or sudden and take place between two consecutive notes. In the first case, they will be responsible more for shaping Musical Momentum within the inner part of motion cycles and, in the second, they will tend to modify the character of motion cycle beginnings (attack moment or accents; either expected or unexpected/displaced ones). Take a look at the A section (bars 129-160) of Chopin's Waltz in C♯ minor Op.64/2 (Figure 4.15) and the way Dinu Lipatti performs (1950) the second half of this section (Figure 4.16a) The compositional structure of the piece shapes clear motion cycles at the (notated) bar level. Lipatti's performance strengthens these cycles in different ways, both through local changes of parametric values and through larger patterns. Bars 145 and 146, for example, are shaped by gradual patterns of decrease of intensity from the first to the third beat (see the wave form patterns in Figure 4.16a representing dynamic/intensity fluctuation), contributing to the overall motion experience with a decrease of MT for each whole cycle. These decreasing tension patterns are crucial in shaping the metacrustic gestures corresponding to these bars, as shown in Figure 4.16c. At the more local level, we observe sudden changes in dynamic values in approaching the beginnings of these bars (145 and 146). These sudden dynamic changes strengthen the perceived character of the corresponding motion cycle beginnings or accents and help to create shape clear bar level motion cycles. This strengthening is represented in the motion graph of Figure 4.16c by the relatively brief but strong Anacruses right before these new beginnings. At a higher level of structure, one can observe a gradual and relatively big crescendo in bar 148, which joins forces with various other structural factors to shape a strong Anacrusis leading into a new four-bar motion cycle (see particularly the higher-level motion graph, where the whole bar 148 has been considered as an anacrustic motion within the four-bar phrase.)

Figure 4.15 The A section of Chopin's Waltz Op.64/2, bars 128-160.

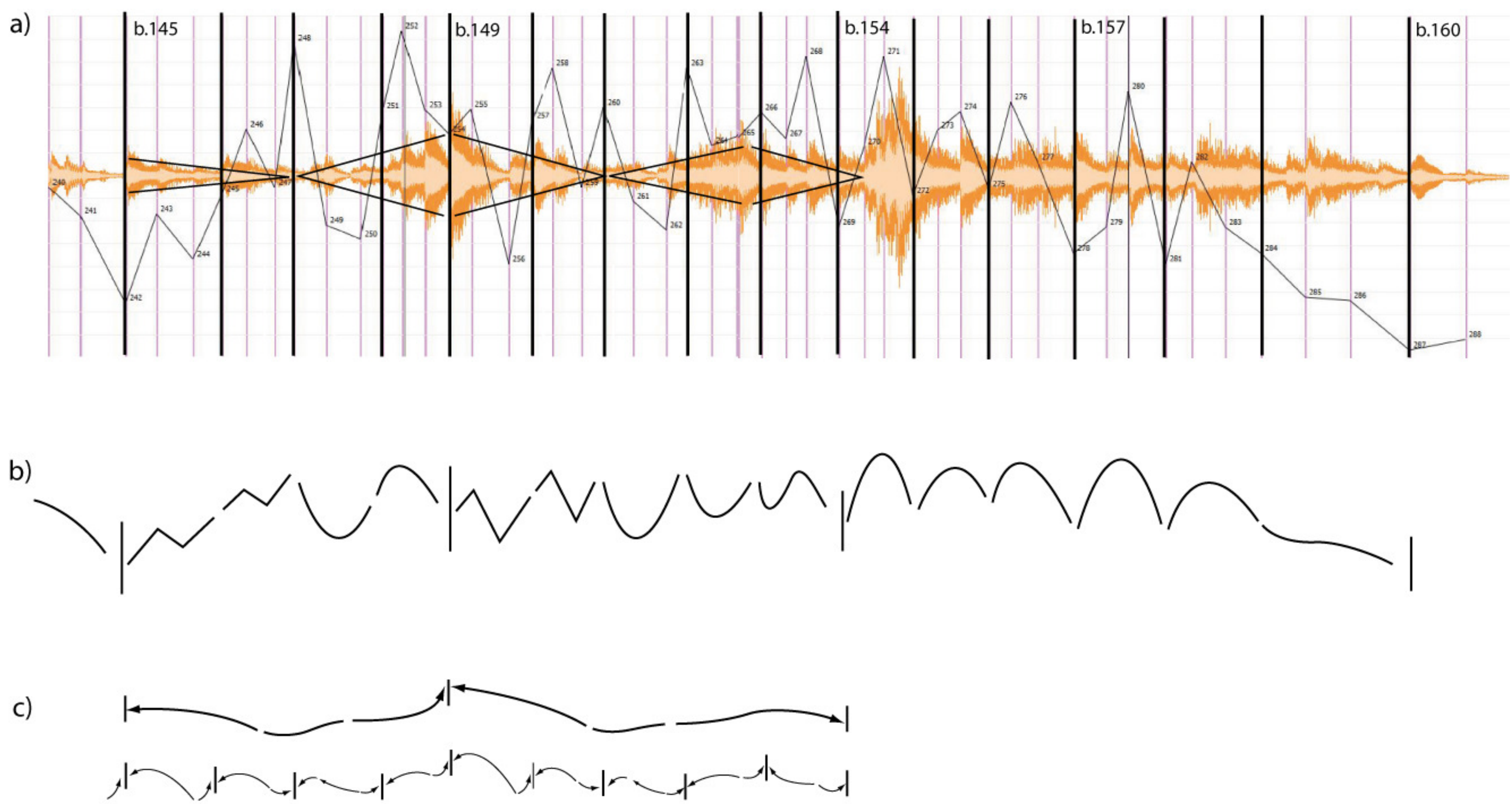

Figure 4.16 a) Tempo and intensity graphs of Dinu Lipatti's performance (1950) of bars 145-160 of Chopin's Waltz Op.64/2; b) tempo pattern segmentation; c) motion graph of bars 145-153. (*Media Example 4.1* SV video capture of Figure 4.16a.)

Tempo patterns, too, have their own function at different levels of structure. At the local level, approaching motion cycle beginnings through an increase or decrease of tempo can have a significant impact on the perceived character of music. Increase of tempo strengthens the Anacrusis that makes possible motion cycle beginnings and gives them a more "edgy" character due to the surprise effect of the early entry. Decrease of tempo weakens the overall strength of the Anacrusis while at the same time giving more time to the listener to prepare for the coming beginning. In the context of a waltz, as here, approaching downbeats with a tempo increase gives the piece a more dance-like character. In fact, the particular tempo pattern of the whole motion cycle will give a specific dance-like character. Two tempo patterns commonly found in waltz performances can be seen in Figure 4.16b. The one is the "Z" ("increase-decrease-increase") tempo pattern, which occurs in Lipatti's performance in bars 145-146 and 149-150 and the other the "U" (decrease-increase) pattern, which occurs in bars 147, 151, 152 and 153. (These new graphic symbols I use in this analytic layer do not represent dynamic movement, as motion graphs do, but show only how tempo graphs can be understood in terms of shorter meaningful patterns delimited by important experienced accents. The direction, therefore, of these patterns closely corresponds to that found in tempo graphs, unlike that of motion graphs which shows how Musical Momentum changes over time.) Both of these patterns are similar in the way they approach the following motion cycle beginning with a tempo increase, and different in the way they leave cycle beginnings. Especially characteristic is the way the "Z" pattern approaches and leave cycle beginnings with tempo increase, something that gives these beginning accents an even more intense feeling. Notice how in this specific context, these initial tempo increases result in delaying the momentum decrease of the corresponding Metacruses (see Figure 4.16c). (This delay is represented in the motion graph by the upwardly-bent arrow of these Metacruses).

The "Z" tempo pattern is particularly suitable for Mazurkas, which tend to emphasise the second beat of every metric cycle. Consider Chopin's Mazurka Op. 59, No.3 (Figure 4.17), for example, where the compositional structure in bars 2-6 emphasises the second beat of each bar by means of anacrustic rhythmic patterns in the melody (see the triplets moving into crotchets). Horowitz's 1973 interpretation shown in Figure 4.17b reacts positively to these rhythmic patterns and emphasises these second beats through tempo increase. At the same time, he also positively reacts to, and further emphasises, the third beats of each of these bars, which mark phrase beginnings initiated through melodic leaps; this is achieved not through tempo increase but through dynamic stress, creating a multilayered accentual pattern. The effect of these two kinds of accentuation is quite different and used for different purposes. While dynamic emphasis can more easily result in secondary motion beginnings (accents), emphasis by means of tempo increase is generally milder and will mostly contribute towards increasing of Musical Momentum at that moment. Compare this Mazurka with bars 147 and 151 of the above Chopin Waltz, where the compositional structure also emphasises the second beats through rhythmic means, and how Lipatti chose to emphasise them not by means of tempo increase, continuing the "Z" patterns of the previous bars, but by means of only dynamic emphasis. Cyprien Katsaris, by contrast, makes sure to emphasise the second beats in all of these bars in the Waltz with the same rhythmic patterns through both a tempo and dynamic increase, making a nice contrast between the bars that precede (see bars 131, 132, 135 and 136 in Figure 4.18.) Note in this example how symmetrically pairs of "U" patterns alternate with "∩" patterns to create a pleasant dance feeling. The similarly arranged dynamic patterns shown below reinforce further this symmetry.

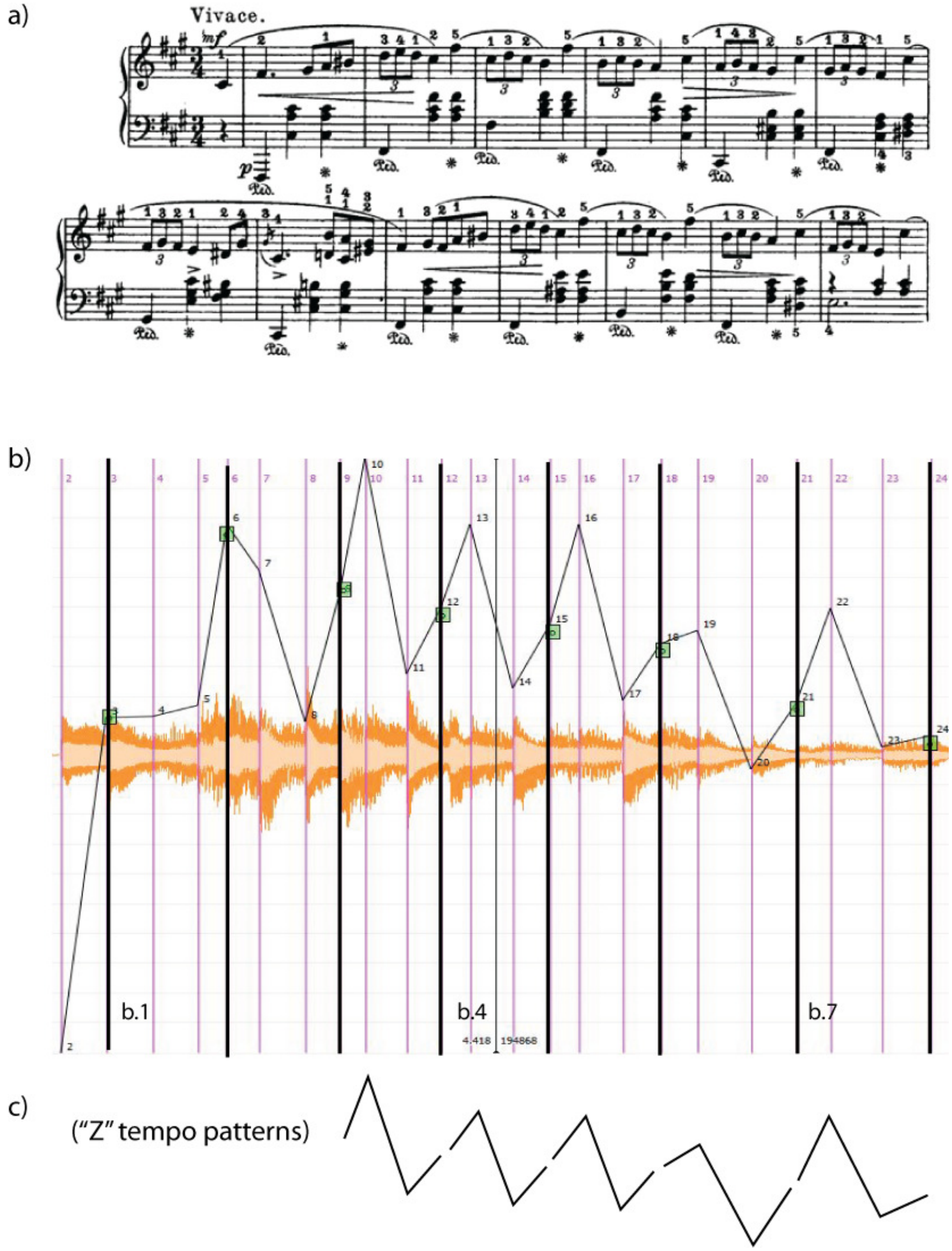

Figure 4.17 The characteristic "Z" tempo patterns in Horowitz's performance of the Mazurka Op.59/3 by Chopin, bars1-9. A) musical score of bars 1-13; b) wave form and tempo graphs, and c) tempo pattern segmentation. (*Media Example 4.2* SV video capture of Figure 4.17b.)

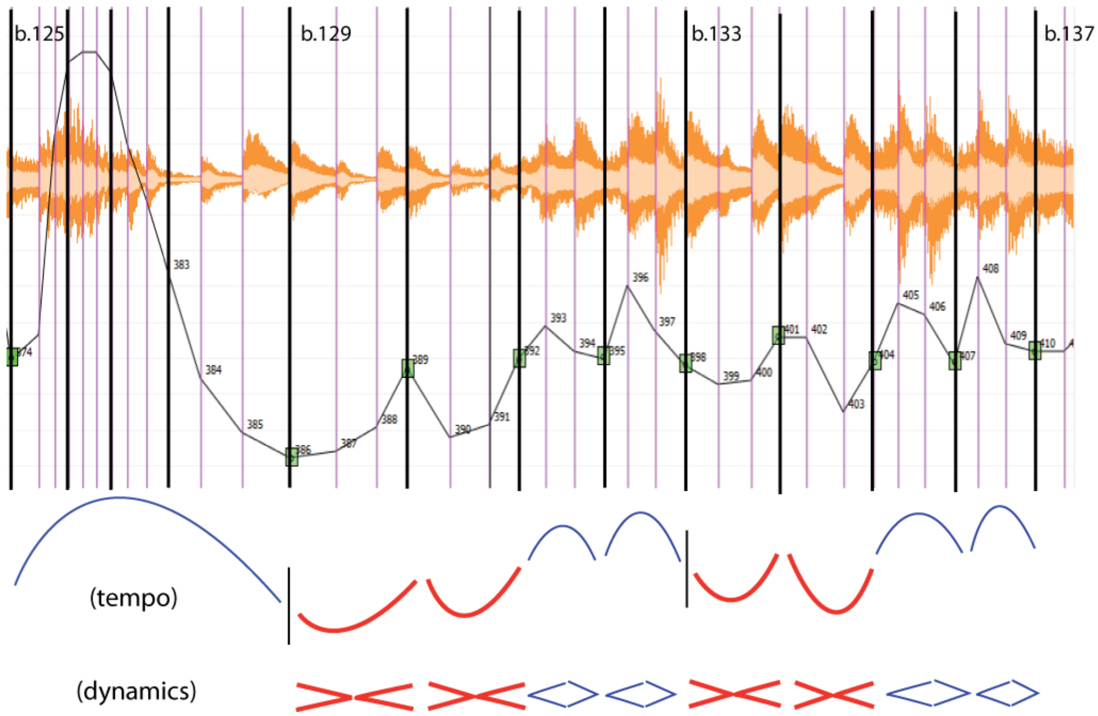

Figure 4.18 Cyprien Katsaris's 1984 performance of bars 125-137 of Chopin's Waltz Op.64/2. (*Media Example 4.3* SV video capture of Figure 4.18.)

One other function of tempo and dynamic patterns is their ability to shape or clarify formal structure. Clarifying structure can mean either articulating more strongly what's already suggested by the compositional structure, or disambiguating what the compositional structure has left ambivalent. Katsaris's 1984 performance of the above excerpt is a good example of how the two sequentially treated four-bar phrases in bars 129-136 are matched with nearly perfectly symmetrical patterns of dynamic and tempo patterns in order to highlight this phrase structure. Note how this symmetry is clearly audible despite the strong dynamic stresses that bring out inner melodic lines. Lipatti's treatment of bars 145-152 is similarly responsive to the sequential aspect of the phrase structure. What's noteworthy here is how an ambiguity in the phrase structure of Chopin's music at the end of these two four-bar phrases becomes less so with Lipatti's performance. Bar 153 seems to belong to neither the previous two four-bar phrases nor to the following two two-bar phrases (154-155 and 156-157). When first heard, bar 153 sounds like the beginning of a new phrase (perhaps another sequential repetition of the first phrase), but in retrospect it sounds more like a link to the phrase group that starts in the following bar, which introduces a new melodic idea. This structural ambiguity in the phrase structure is left to the hands of the performer to decide whether to leave intact or attempt to disambiguate. As Figures 4.16b suggests, Lipatti chose to group this extra bar (153) with what comes before. Even though bar 152, the last bar of the sequential phrase, seems to be driving anacrustically into a new higher-level motion cycle, as previously at bar 149, the following bar extends this Anacrusis until bar 154. The tempo decrease, which in bar 148 helped to prepare the arrival of the new cycle beginning, is now postponed until bar 153 (see the "S" tempo pattern—decrease-increase-decrease— at that point and note how in both of these phrases the only time we have a tempo decrease across a bar is at the end of each higher-level phrase), while at the same time the dynamic increase of bar 152 does not continue all the way to the following bar, as before, but gives way to a dynamic decrease.

Even though Lipatti seems to be making a conscious effort to articulate a phrase boundary at bar 154, the result is still not as obvious as that in Rachmaninoff's performance of this Waltz (*Media Example 4.4*) Listen to how Rachmaninoff, starting from bar 150, initiates a gradual tempo and dynamic decrease, which reaches remarkably low levels by the end of bar 153, suggesting a clear phrase ending. The sudden dynamic and tempo increase at bar 154 very clearly sets the music that follows apart from what came before. The technique of articulating the end of phrases through a pronounced decrease in both tempo and dynamics is more common at the very end of formal sections as in Lipatti's bars 158-160 (see Figure 4.16a). It is very often seen in the context of a symmetrical pattern of increase followed by decrease in both tempo and dynamics. This is demonstrated in Figure 4.19, which shows Lipatti's shaping of the whole first half of the A section of the Chopin Waltz.[232](The crescendo-decrescendo signs above the wave form and the arch above the tempo graph demonstrate this more clearly.)

[232] This technique, known as "phrase-arching", has been particularly studied by Neil Todd in "A model of expressive timing". For a historical perspective on the use of this technique in a specific piece by Chopin see Nicholas Cook, "Objective expression". According to Doğantan, "Lussy is the first theorist to point to an essential connection between variations in intensity and tempo in performance. According to his theory, acceleration is naturally associated with crescendo, while ritardando is coupled with decrescendo". See Doğantan, *Mathis Lussy*, p.129.

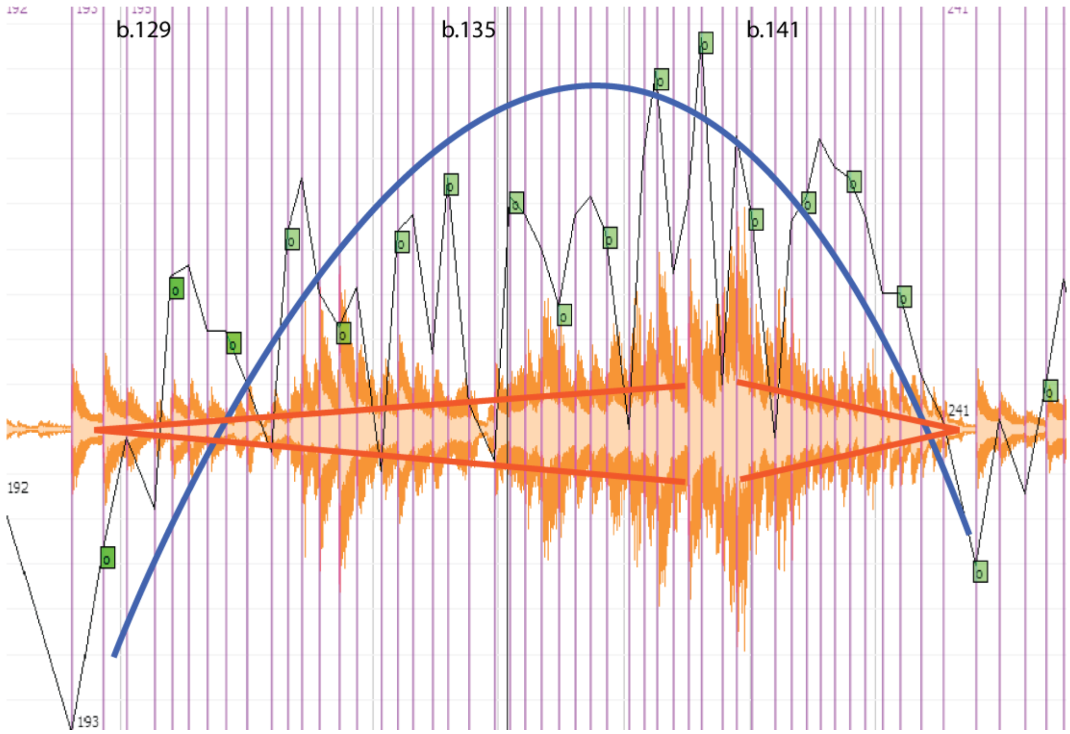

Figure 4.19 Phrase arching in Lipatti's performance of bars 129-144 of Chopin's Waltz Op.64/2. (*Media Example 5.5* SV video capture of Figure 4.19.)

At the four-bar level, phrase arching can be seen in Witold Malcuzynski's performance of bars 129-132 of the Chopin Waltz (Figure 4.20a). This interpretation seems to be encouraged by the harmonic structure of this first four-bar phrase, which places a tonal closure at the end of its fourth bar. The resulting motion structure at this four-bar phrase level can be seen in Figure 4.20b: a weak Metacrusis, followed by Increase and Decrease momentum phases, and a weak Anacrusis. This is not the most typical interpretation of this passage, however, given an opposing structural force, which tends to drive bar 132 anacrustically into the beginning of the following four-bar phrase (see the anacrustic rhythms of bars 131-132, whose forward moving character lead strongly and naturally into the metacrustic melodic descend of the following bar). The interpretation of Lippatti we saw above (the repetition of this passage in bars 145-148) responds more to this opposing structural force, as seen in Figure 4.16a and c: the opening relatively strong Metacrusis at the four-bar level, followed by Decrease, Increase and a strong Anacrusis. (Notice how the interpretations of Lipatti and Malcuzynski have the reverse motion structure. See Figure 3.14a and b, discussed in the previous chapter.) Of course a performer could react more or less equally to both structural aspects, resulting in a balancing or neutralising of the opposing forces in effect at the same time.

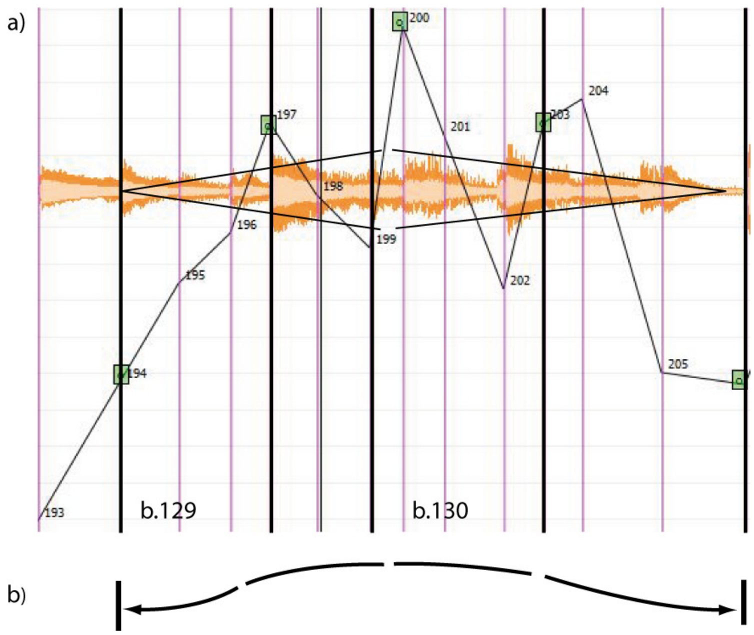

Figure 4.20 Phrase-arching at the four-bar level in Malcuzynski's performance (1960) of bars 129-132 of Chopin's Waltz Op. 64/2. A) tempo and dynamic fluctuation; b) motion graph. (*Media Example 4.6* SV video capture of Figure 4.20a.)

The same issue of conflict between different structural aspects we saw in bars 131-132 and 147-148 can also be seen in bars 129-130 and 145-146. Lipatti seems to react more to the expressive potential of the melodic line (the descending melodic line in sixths), resulting in the strong Metacrusis seen in the top graph of Figure 4.16c. Malcuzynki's weak Metacrusis and subsequent increase of momentum, on the other hand, reacts more to the harmonic structure of the left hand accompaniment. The harmonic function of the chord of bars 130 or 146 does not naturally support the decreasing momentum phase of a Metacrusis but instead points anacrustically forwards into the following bar. This chord, a secondary dominant seventh, relates anacrustically to its resolution V chord that follows. Thus, a performer might want to either minimise the inherent forward-directed character of this secondary dominant seventh, Like Lipatti, or emphasise it even more, like Malcuzynski. Cortot's interpretation of this phrase at the very beginning of the piece (see Figure 4.21) makes sure to bring out both aspects of this structure: he plays the first and a half bars with a decrescendo, which shapes a clear Metacrusis as "demanded" by the melodic line, and the second bar with a very steep accelerando (and a mild crescendo), which increases drastically the RD (but also to a lesser degree musical tension) of the passage that leads through the applied dominant seventh chord of the left hand into the third bar.

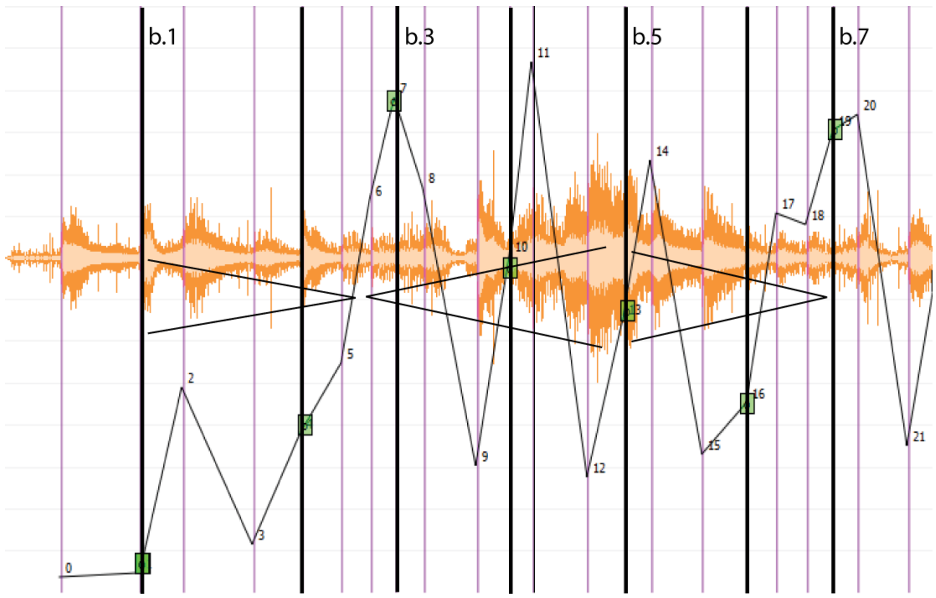

Figure 4.21 Alfred Cortot's performance of bars 1-6 (the same music as bars 129-134 of Figure 4-19a) of Chopin's Waltz Op.64/2. (*Media Example 4.7* SV video capture of Figure 4.21).

In the following example, an excerpt from Chopin's Mazurka Op. 59, No.3 (Figure 4.22a), the melodic line conflicts with the left hand accompaniment, which articulates clear triple metric cycles in agreement with the notated metre. The structure of the melodic line is such that encourages gestural patterns whose focal moment is one beat earlier (third beat of bar 18) than that demanded by the established or notated metre. Vladimir Horowitz (see his performance in Figure 4.22b), wishes to make this structural incongruity even more apparent by strengthening further the conflicting articulations of the melodic line by aligning them with a series of "U" tempo patterns. The result is that if a listener focuses heavily on the regular metric structure of music, this emphasis on the third beat of bar 18 will be experienced as a syncopated accent; if on the other hand a listener tends to be carried more by the rhythmic subtleties of the melodic line, the sense of metric feel could be so disturbed to the point where the downbeat of bar 19 is experienced as having been displaced one beat earlier.

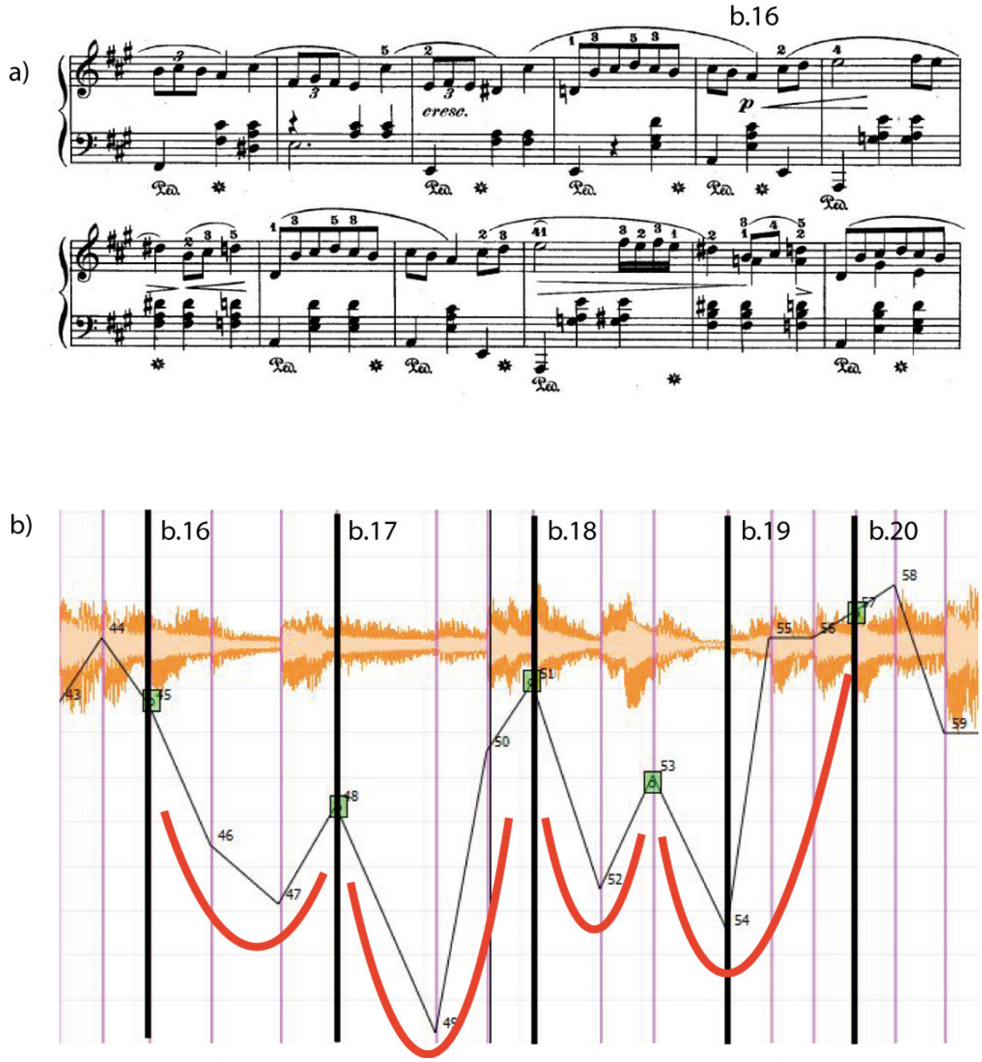

Figure 4.22 The contribution of "U" tempo patterns to the displacement of the downbeat in Vladimir Horowitz's performance of Mazurka Op.59/3 by Chopin, bars 16-20. A) musical score of bars 12-23; b) tempo graph and waveform of sound file. (*Media Example 4.8* SV video capture of Figure 4.22).

Finally, performance structure can contribute in ways other than the ones mentioned above, having to do more with surface details of different kinds. Specific ways of articulating each note—such as staccato, tenuto, pedalled etc.—can give different colours to a passage. Moreover, emphasising specific notes within the musical structure in different ways can help bring out various hidden contrapuntal lines (for an example, listen to the above excerpt of Katsaris's performance of the Chopin Waltz; Media Example 4.3). The surface of the musical flow can also be given a particular feel by surface details in the tempo fluctuation graphs. Consider, for example, the smoothly shaped tempo pattern in Katsaris's performance of bars 125-130 (see Figure 4.18), which gives a correspondingly smooth feeling to the experienced musical flow. I will devote the whole next chapter for discussing more issues relating to performance structure and expression.

CHAPTER 5

Analysis of Performance Interpretation

The analysis of music has for a long time been synonymous to the analysis of the musical score. As a result, the majority of music theory and analysis has been concerned with the compositional design of music. Performance expression and design have only been studied more systematically in recent times, when technological advancements have made it possible to easily extract information about the performance of a piece from commercial recordings. We can thus now talk not only about the compositional design of music as seen in the musical score but also about the way performers have given flesh to the score through performance. This is very important for the study of musical expression since both structures are equally important in determining the expressive meaning of music: while the compositional structure contains the seeds of expression, it is only when performers perform a piece and listeners perceive it that expression acquires full meaning. In this final chapter, therefore, I will complete the exploration of expressive meaning by studying more closely those structural parameters that performers control in shaping expression, and specifically tempo and dynamic fluctuation graphs. This will be done from various different points of view and experience, taking into account and synthesing aspects of compositional and performance design, performers' and listeners' experiences as well as purely theoretical and pedagogical concerns.

While the work of this chapter is largely theoretically driven, in the sense that an important goal is to make systematic observations and build theoretical models to understand performance expression, all of this is done having in mind the ultimate pedagogical goal of this thesis, which aims at providing ways to explore musical meaning that enriches musical understanding and experience in positive ways. More explicit remarks about how this work can be used for pedagogical purposes can be found in the epilogue. Nevertheless, one can read a lot about my underlying pedagogical goal by the way I go about exploring the subject of this chapter.

While I devote a lot of time making careful observations of abstract patterns directly found in tempo and dynamic graphs in a rather traditional, conceptual way, their meaning is always searched in relation to both the performing and listening process.

Given the specific gestural language I use for this purpose, which is highly bodily and performance relevant, the actual analytical process and thinking becomes an integral part to intuitive/bodily hearing and performing. Since a lot of what I present in this chapter can provide a model of analysis for students, the result is what I see as the encouragement of a more balanced body-mind hearing that enhances musical experience and understanding: by translating these structural/graphic details of expressive meaning into a felt language, one becomes more sensitised to them so that the acts of listening and performing are enhanced.

Since part of the way I will present the material of this chapter reflects my own discovery and self-interrogation process, I will begin with what is readily available to me—the tempo and dynamic fluctuation graphs—and gradually find ways I can assign them meaning both in relation to the compositional structure and embodied experienced. Central among the tools I will be using for this purpose will be the arrow gestural notation already presented and used in previous chapters, with the goal of testing to what extent this graphic system is adequate or useful for this purpose, and of showing what aspects of performance expression it can illuminate and in what ways it can be further extended or supplemented with new tools and theoretical concepts.

5. 1 Tempo and dynamic fluctuation

When I listen to a piece of music, I can tell that tempo (along with dynamic) fluctuation plays an important part in its unique expressive character. This fluctuation takes place on at least three levels of structure. At the broadest level, the general tempo of each piece may change at various key moments, coinciding with or indicating a change of movement or section. This tempo change can be significant and easily noticeable, and is partly responsible for the general character or mood of the piece. At the middle level, we can have more gradual, but still rather broad, changes of tempo that are equally noticeable and generally occur at the boundaries of large sections or phrases (such as, for example, the very common rit./a tempo at selected moments). The level at which the most tempo fluctuation occurs, however, is that of the surface, which is responsible for details of expressive character. While such microvariations in tempo can be pronounced enough to be easily noticeable (especially in Romantic music where tempo rubato is a hallmark in performance style), they are not generally a direct focus of attention by either the listener or the performer. As a listener, in other words, my appreciation or understanding of the expressivity of music does not depend on my conscious trace of these tempo fluctuations (the same way as when I follow the melodic line of a song, for example). Not even as I perform a piece am I always aware when, how and why I bend tempo. Instead, either as a listener or performer, I perceive tempo fluctuation as part of a more unified structural complex experienced, as I argue in this thesis, as expressive gestural movement.

Conscious tempo decisions occur mostly at the higher and middle levels of tempo, such as when I decide in advance about the general tempo of a piece or movement or when I choose to make an obvious gradual decrease or increase of tempo. Conscious tempo control can take place at the lower level, too, such as when I decide to play a passage with flat tempo for some special expressive reason, or exaggerate tempo fluctuation for the opposite effect. I could also choose to play with the listener's expectation by momentarily holding the tempo back, for example, at moments when it's least expected. Emphasising various pitches or moments during the course of the piece can also be achieved by pronounced local tempo increase or decrease. Such more subtle surface details, however, tend to be removed from the level of conscious tempo manipulations and the more they do so the more interesting, but also difficult to understand, they become. It is this lowest, largely unconscious level of tempo control that I am mostly interested in here; in those details that cannot easily be explained in any obvious manner, yet are of great importance in the overall expressive experience.

Loudness and articulation are as important as when a note is struck. Particularly interesting is dynamic fluctuation, which, like tempo fluctuation, unfolds in constantly increasing and decreasing patterns of seemingly little predictability and order. As in the case of tempo, dynamics is controlled both at the conscious and the unconscious level. Performers can consciously decide when to play louder or softer, crescendo or decrescendo at specific moments in the piece, while listeners can perceive such changes as such. At the same time, smaller-scale changes of dynamics are shaped without performers or listeners always being aware of them. Where performers perhaps take more extra care with detail at the moment-to-moment level is in articulation, which is controlled at a more conscious level during performance.

Let us look at the tempo and dynamic fluctuation graphs of a specific piece, Chopin's Etude in E, Op.10, No.3 (Figure 5.1). An excerpt from Murray Perahia's performance of this piece is shown in Figure 5.2. A few things need to be explained about these graphs. What the dynamic graph (blue/thick wavy line) shows is the global dynamic data extracted from the sound file; that is, it doesn't tell us how loud a performer has played specific notes but how loud a moment in the musical flow has sounded, which is usually the result of a number of different notes sounding together, both because several notes have been played at the same time or because other notes have been sounding as a result of note- or sustaining-pedalling as well as other acoustic reasons. This means that, with these graphs, I can never have precise information about the dynamic values or the articulation of specific notes (either of the melodic line, which often carries most of the expressive power of a passage, or of separate contrapuntal lines.) This, however, won't be a major problem in what I will be doing below for the following reasons: firstly, the degree of detail of articulation that influences aspects of gestural meaning that I am concerned with here can be accessed through listening to the sound file; and secondly, when I will be considering the contribution of dynamic fluctuation in expressive movement, it is this global dynamic information that I am mostly interested in since my motion graphs capture the expressive power of all of the structural factors involved at the same time. I don't provide separate graphs for the melody and the accompaniment, for example, or for different concurrent melodic lines, (or at least the examples that I will be considering will be such that a single motion graph will be sufficient). Moreover, in cases where I do want to consider two different lines independently (as I did in the previous chapter in special cases for specific purposes), I will be using my ear, as I always do anyway since I use these graphs as an extension to my ear and not as a substitute of it.

Figure 5.1 Bars 1-26 of Chopin's Etude in E Op.10, No.3.

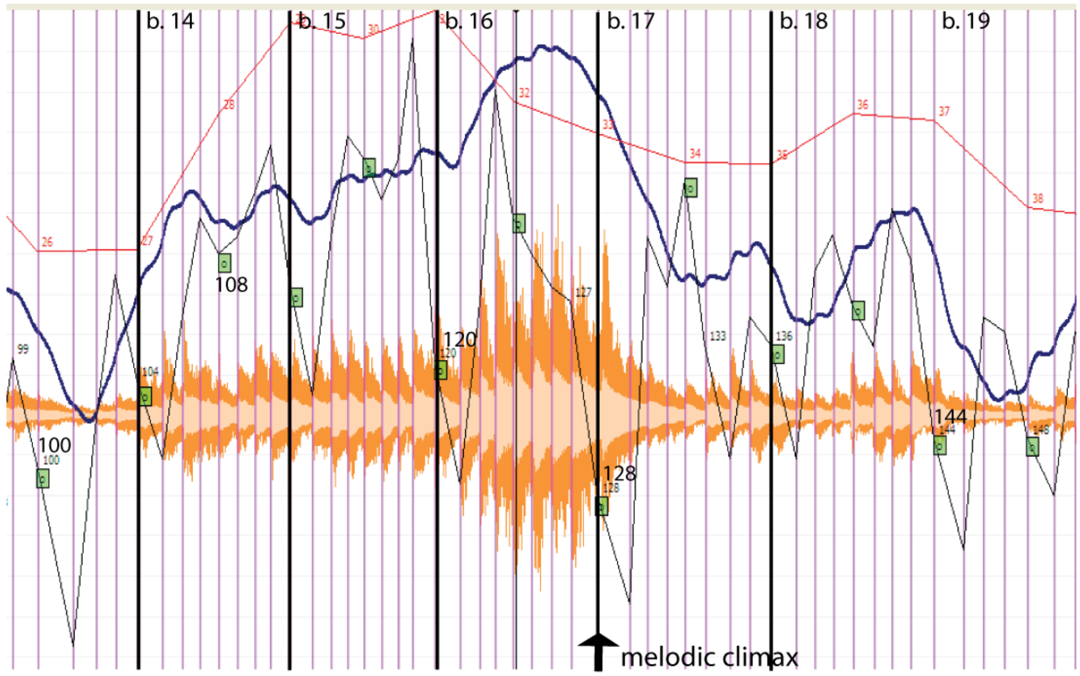

Figure 5.2 Tempo graphs at the semiquaver and crotchet beat levels and a dynamic graph (blue/thick wavy line) of Murray Perahia's performance (2002) of bars 14-18 of Chopin's Etude in E. (Remember that green squares on the semiquaver-level tempo graph indicate salient musical emphases determined by ear.) (*Media Example 5.1* SV video capture of Figure 5.2.)

With tempo graphs things are different. Take another look at Figure 5.2. At the semiquaver beat level (see the thin vertical lines in the graph), each sound I hear corresponds to a specific tempo value as indicated by the lower tempo graph shown here. As I visualise in real time this graph in Sonic Visualiser, these tempo changes sound quite intuitive: the higher the tempo value of the note I hear, the faster I perceive it as occurring in the musical flow. (In other words, these are tempo graphs as opposed to duration graphs, whose values would have the reverse profile.) In addition to hearing each note as occurring with a specific tempo value, I can hear tempo processes of acceleration and deceleration as suggested by the upward and downward direction of the graph. I can hear, for example, a note (let's say the one corresponding to Beat Point (BP) 120 at the semiquaver level on the downbeat of bar 16) as decelerating, reaching a relatively low tempo value. When, however, I look at the crotchet beat level tempo graph, I realise that that same note (BP 31) is shown to have the opposite qualities: it is accelerating, reaching the highest relative tempo value during the A section of the piece. How is that possible and which graph represents more accurately my experience of tempo fluctuation? The answer lies in what beat level I focus my attention at while listening to the piece. If I focus on the semiquaver beat level, I hear this note as decelerating, whereas if I focus on the crotchet beat level I hear that same note as accelerating. This is because the tempo values that correspond to each note are beat level specific: they are not properties of the notes we hear but the rate at which the underlying beat occurs in time.[233] Thus, the tempo value at BP 31 at the crotchet level is the result of the specific duration of the previous beat, and the acceleration up to that point is the result of the shorter duration between BPs 30 and 31 in relation to BPs 29 and 30. The tempo value of BP 120 at the semiquaver level, by contrast, is the result of the longer duration between BPs 119 and 120 in relation to BPs 118 and 119.

Even though, when listening to music, we normally focus our attention on a specific beat level, the effect of the influence of other beat levels is always present (similar to a situation where we can hear a secondary dominant in the context of the main key). In fact, the more sensitive one becomes to the expressive nuance of music, the more one can experience different levels of structure at the same time. In Perahia's performance, the most comfortable beat to follow while listening (the tactus) is the crotchet beat, as any instinctive attempt to tap a regular beat indicates. The influence of the semiquaver beat, however, is not insignificant and in fact it is more crucial in perceiving details of expressive character. What seems to happen is that we can hear the overall accelerating character of the larger beat, for example, while at the same time we can hear each part of this beat as accelerating or decelerating. (This experience can be compared to a situation when one takes the fast train to get somewhere, and even though there will be moments when the train slows down, or even stops, and accelerates at different speeds, the overall sense is that one gets to the destination faster than if going with the slower train.) Thus, despite the pronounced deceleration during the last semiquaver beat of bar 15, the overall sense is that the downbeat of bar 16 has been approached through a relative accelerating motion. This is due to the highly accelerating motion during the middle part of the second crotchet beat of bar 15, which gives this beat an overall accelerating and forward moving character. The deceleration during the very last part of a crotchet beat, a very frequent phenomenon in the whole performance of this piece, is only responsible for giving a feeling of roundness (as well as emphasis) to the beginning accent of the following motion cycle and not for the overall directional force of

[233] Despite the fact that we do know that notes themselves do not move or accelerate, we find it very convenient and intuitive to talk about the experience of musical motion in terms of notes moving as if they were objects moving in real space-time. Recall the discussion about Johnson's "Moving Music Metaphor" in chapter 3.

the passage. After that, there is a process of gradual deceleration leading to the climax on the downbeat of bar 17. Even though decelerating, this process has a strong forward momentum due to the tempo shape at the lower beat level—a pronounced accelerating process during the first half of the bar. What's even more interesting, adding further to the forward momentum of this bar, is the way this momentum is carried over by the dynamic increase well into the second half of the bar.

In short, Perahia's approach gives the downbeat of bar 16 a secondary emphasis (through both the local tempo delay and the higher-level tempo peak) on the way to the main climactic moment on the following downbeat. Compare this with Horowitz's approach, shown in Figure 5.3, which prefers a more continuous motion on the way to the melodic climax (high G♯) of the downbeat of bar 17: with the exception of a local, but relatively weak, tempo delay in approaching the downbeat of bar 16 (notice how here there is a tempo delay only before the downbeat of bar 16 and not after as well, as in Perahia's performance, making the emphasis less pronounced),[234] tempo and dynamic processes move in phase to shape an uninterrupted forward motion from bars 15 to 17. Particularly characteristic is the pronounced decelerando (throughout most of bar 16) preparing this climactic moment which, like the local tempo delay that occurred earlier, helps to prepare the anticipated arrival. While in the case of the local tempo delay there was the effect of a slight emphasis and roundness of the approached accent, the longer decelerando here stretches time and heightens further the expectation of the arriving goal. What makes this tempo "stretching" even more intense is the high dynamic level at that point (see the dynamic pick in the middle of bar 16), which has built up since bar 14.

[234] The common practice of making a tempo delay before and after an important moment (usually downbeats) in the musical flow will be discussed below.

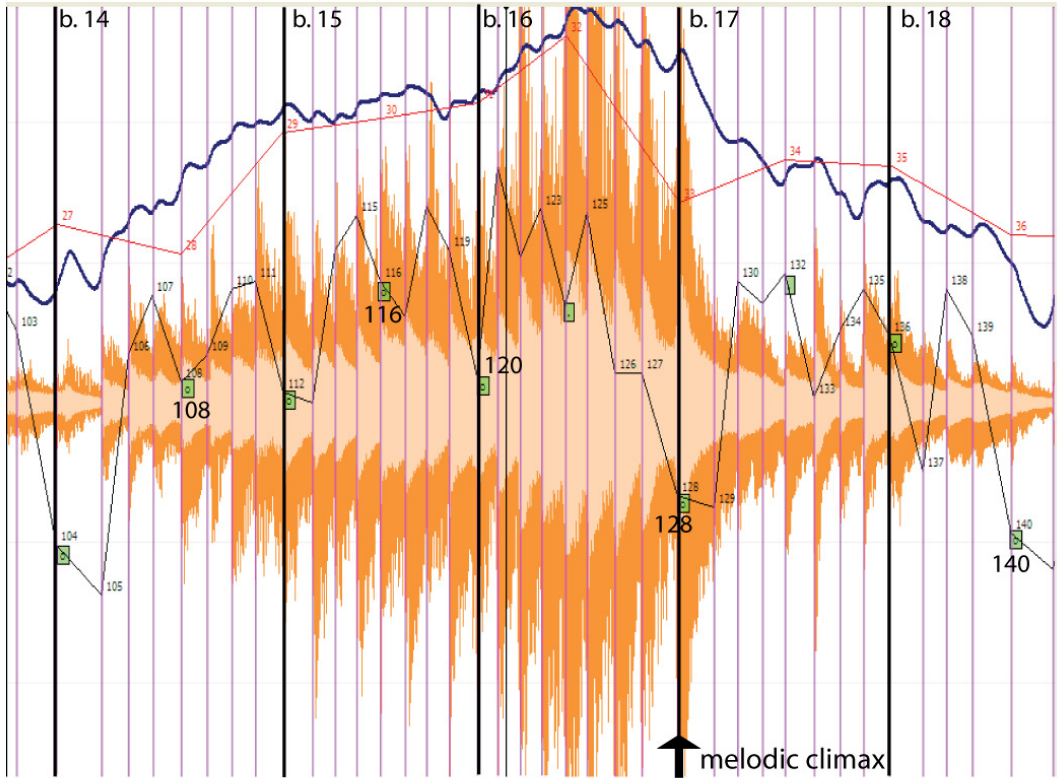

Figure 5.3 Vladimir Horowitz's performance of bars 14-17 of Chopin's Etude in E: tempo graphs at the semiquaver and crotchet beat level and a dynamic graph. (*Media Example 5.2* SV video capture of Figure 5.3.)

In different contexts, tempo decrease can function in different ways. Consider, for example, the tempo drop during the first half of bar 4 in the crotchet-level tempo graph shown in Figure 5.4 (this is Cyprien Katsaris's 1992 performance of Chopin's Prelude in A♭ we saw in the third chapter;), which has a very different effect. Unlike the tempo drops we saw above, which occur before downbeats, this one here occurs after the downbeat of bar 4. Joining forces with the decrescendo and melodic appoggiatura at that point, it helps to decrease Musical Momentum by decreasing both MT and RD. At the lower (semiquaver) level, this is further supported by a very brief tempo decrease right after the downbeat, which adds a very expressive sigh-like effect. This is a very typical lower-level tempo drop, which occurs after the beginning of most (at least in this piece) metric cycles at the bar motion cycle level. It occurs in all downbeats of the short excerpt in Figure 5.4, in almost the entire excerpt in Figure 5.2 and in about half of the one of Figure 5.3. In most cases it is also preceded by a local tempo drop before the beginning accent and both together help to give this accent a more rounded, elastic feel (in the same way when we jump down on the ground we bend our knees for a smoother landing). In addition, it gives a stretching feeling to the beginning of the cycle, something that demands immediate tension resolution. This stretching is particularly effective in melodic moments that require special weight for various expressive reasons. In the case of the prelude of Figure 5.4, it works very effectively together with the appoggiatura, which is given extra amount of tension before it is resolved.[235]

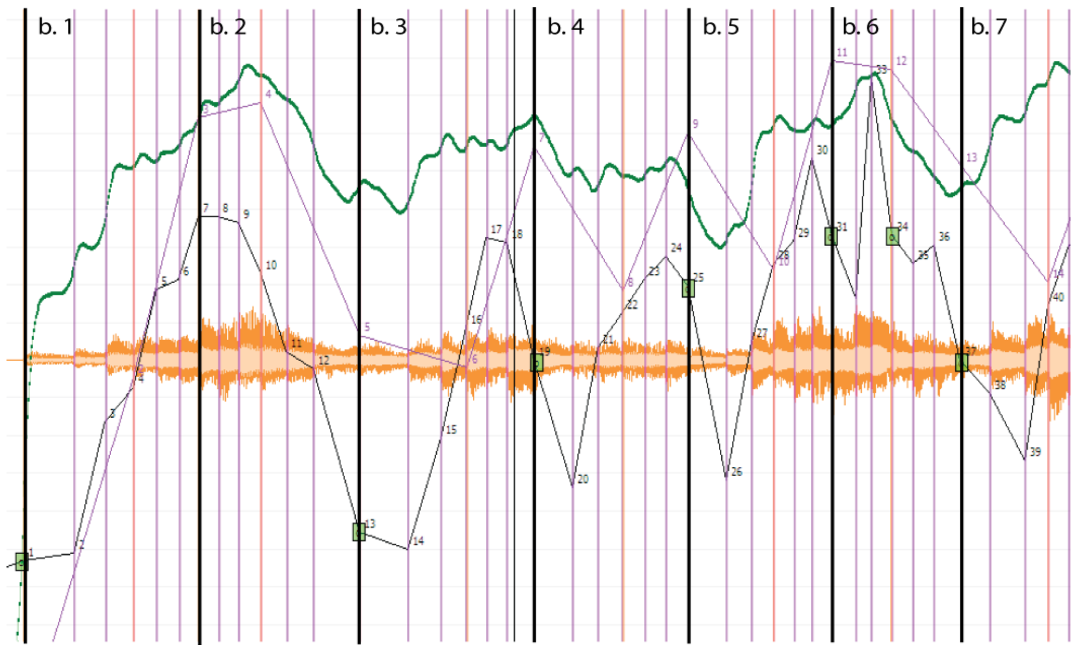

Figure 5.4 Cyprien Katsaris's 1992 performance of bars 1-6 of Chopin's Prelude No. 17 in A♭: tempo graphs at the semiquaver and crotchet beat level and a dynamic graph (for the musical score see chapter 3, Figure 3.7). (*Media Example 5.3* SV video capture of Figure 5.4.)

Alfred Cortot seems to make special use of such local after-downbeat tempo drops as his 1933 interpretation of the Chopin Etude in E shows. A particularly characteristic one can be heard after the downbeat of bar 15, lasting for two semiquaver beats (see Figure 5.5a). This stretching, which reaches relatively very low tempo levels (considering

[235] The terms I use for describing the expressive quality of accent, such as "rounded" accent, or of process, such as metacrustic stretch, refer not only to how one perceives or bodily experiences the sound but also to how a performer (in this case a pianist) physically prepares the sound. In order to make possible a more rounded note at the downbeat, for example, a pianist will often prepare that note by raising the finger more than what is normally needed, making a bigger, cyclical (rounded) hand movement that takes extra time in depressing the piano key. Similarly, in order to make possible what I described as a metacrustic stretch (tempo drop with dynamic emphasis), bigger and more tense hand gestures are required. The interconnection between the physicality of piano touch (including the "initiatory" hand gesture) and the perceived timbre or expressive character of sound is discussed in Doğantan, "In the beginning was gesture".

that this moment does not lie at the boundaries of higher-level phrases, where low tempi are more common), is given extra tension by dynamically stressing the first two notes of the bar. This results in a "metacrustic stretch", a local increase of Musical Momentum during the initial Metacrusis, prolonging the expected decrease of momentum (see the motion graph below in Figure 5.5b). What dramatises it even more is the immediate dynamic drop following these stresses, after which a gradual increase in both tempo and dynamics reverses movement, from a backward-pointing Metacrusis to a forward-moving Anacrusis.

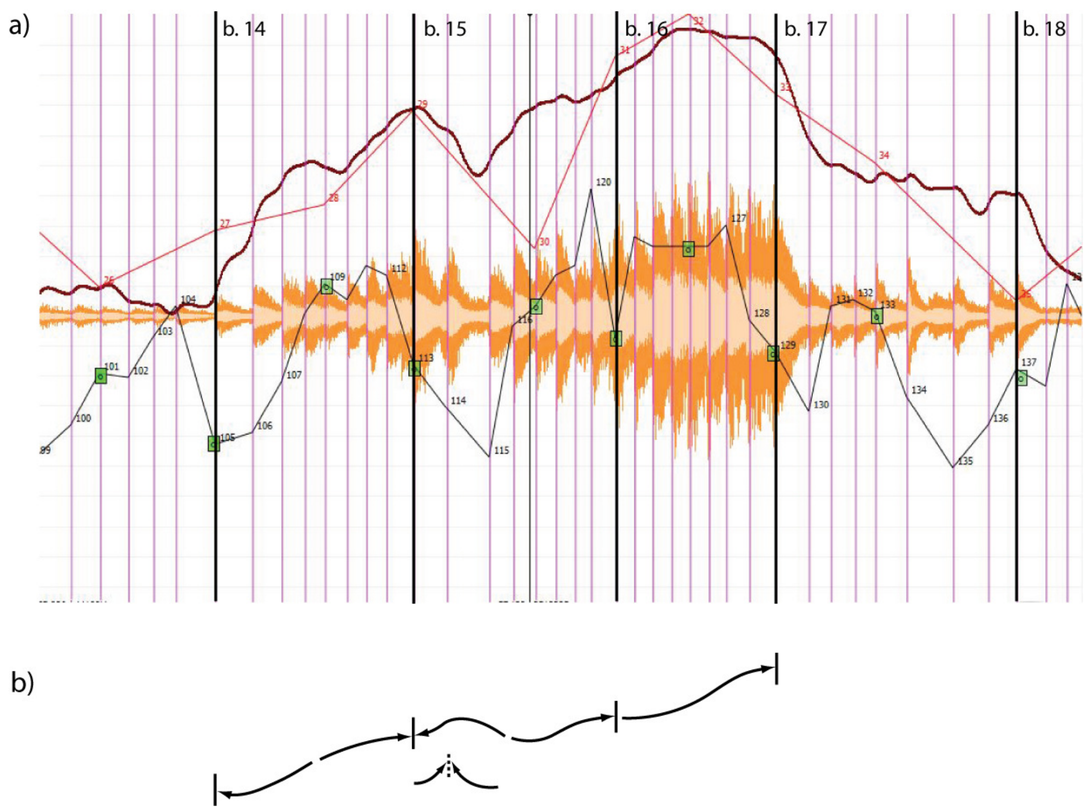

Figure 5.5 Cortot's performance of bars 14-18 of Chopin's Etude in E. a) Two tempo graphs at the semiquaver and crotchet beat level and a dynamic graph; b) motion graph. (*Media Example 5.4* SV video capture of Figure 5.5a.)

Of particular dramatic effect are also the tempo drops found at the very beginning of Cortot's interpretation of this Etude (BPs 3-4, 10-11 and 13-14; see Figure 5.6). What makes them unique is the fact that they occur on relatively weak metrical beats. The combination of local tempo drops and sudden dynamic accents initiating well-shaped decrescendos articulates strong accents that highly conflict with metrical accentuations demanded by the compositional structure. This conflict is great enough to create a temporary ambiguous metrical feeling where Cortot's accentuations tend to be perceived as more dominant. The greatest metrical ambiguity occurs in bar 1, where after the clear downbeat at the beginning of the bar, a strong accent on the third semiquaver (see the green square on the tempo graph at this moment representing this conflicting accent) surprises the listener and disturbs the expected regular metrical grouping. In what immediately follows, both the middle of bar 1 and the following notated barline in bar 2 are significantly deemphasised, to favour this time the second semiquaver of the notated second bar. And while, at the beginning of the piece, what seems to dominate metrically is the third semiquaver beat (and later the second semiquaver beat of bar 2 and 3), the middle of the notated bar gradually becomes stronger in the following bars. In the motion graph of this section shown in Figure 5.6b, I have used solid vertical lines to represent the most dominating (some of which compete with each other for metrical dominance) motion cycle beginnings, and with dotted vertical lines below, what I hear as subsidiary cycle beginnings. Note also the way I have chosen to notate consecutive Metacruses in bars 1-3 (by omitting Anacruses, which are normally included to represent preparations of the following cycle beginnings, and leaving a space between the end of the first of two consecutive Metacruses and the beginning of the other), in order to convey the surprise element in the way the above mentioned syncopated accents (third semiquaver of bar 1 and second semiquaver of bars 2 and 3) are experienced.

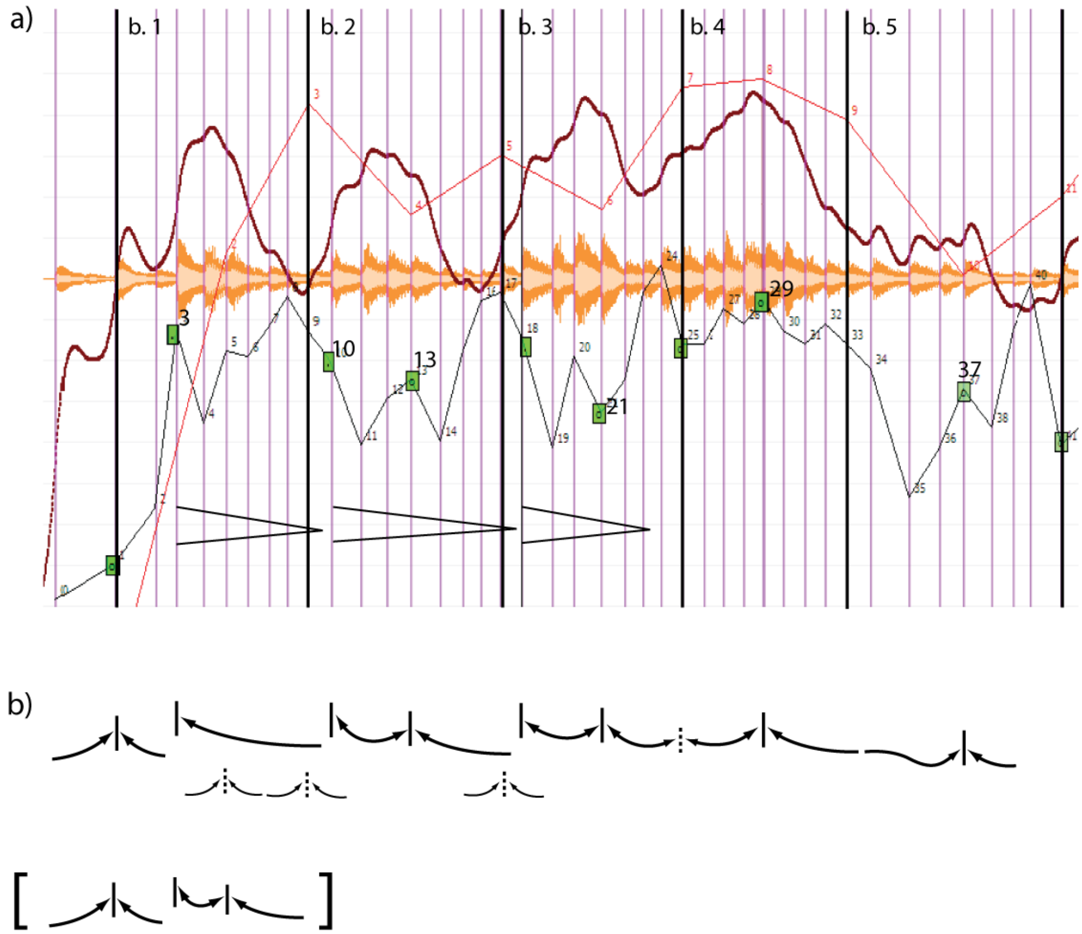

Figure 5.6 Cortot's performance of bars 1-5 of Chopin's Etude in E. a) two tempo graphs at the semiquaver and crotchet beat level and a dynamic graph; b) motion graph. (*Media Example 5.5* SV video capture of Figure 5.6a.)

So far, we've seen four kinds of tempo drops (before and after downbeats at both lower and higher tempo levels) and their effect in different contexts, involving not only the compositional structure but also, and especially, dynamic patterns. Going back to Figure 5.4, I will now proceed to observe some functions of tempo increase. During the first bar of Katsaris's performance of Chopin's Prelude, the tempo increase at both beat levels, together with the dynamic increase, shape an increase of momentum phase. This process reverses during the second bar, first initiated by the lower-level tempo decrease on the second quaver, then by the decrescendo starting on the fourth quaver and lastly by the higher-level tempo decrease on the fifth quaver. The fact that these patterns change direction at different points makes possible a much smoother momentum reversal. Thus, the absence of a strong articulation at the peak of this Musical Momentum curve does not allow the opening IN phase to turn into an AN phase to satisfy the expectations of the listener. This expectation is, however, satisfied in the following three bars, where increases of tempo at both beat levels during the second half of these bars shape strong anacrustic movements that help articulate unambiguous metric cycles coinciding with the notated meter. (For a motion graph of this excerpt see Figure 3.13 in the third chapter.)

Tempo increase, especially at lower beat levels, does not always function within an overall increase of momentum processes. A good example is the lower-level tempo increase supporting the melodic appoggiatura in bar 4 of the Chopin Prelude we just saw (Figure 5.4). During the first half of this bar, the tempo increase after the initial tempo stretch does not have enough strength to overpower the other structural patterns that encourage decrease of Musical Momentum. Having reached a relatively low tempo level during the initial stretch, tempo needs to recover normal tempo levels before it can resume its forward-driving function. This is the same kind of pattern we saw in bar 15 in Cortot's performance, as shown in Figure 5.5, and one that is very frequently found in many places: in its bar level context, an "S" lower-level tempo pattern joins a "U" shaped higher-level one and a "> <" shaped dynamic pattern to shape Metacrusis-Anacrusis gestural patterns, or type 1 (prototypical) motion cycle patterns—see Figure 3.14 in the third chapter.

A different kind of metacrustic stretch can be seen in Figure 5.7. Instead of lowering the tempo after the downbeat as in the examples we've just seen, a local tempo increase can function in a similar way but with its own unique effect. At the beginning of bar 7, the descending melodic fifth encourages Cortot to perform an interestingly dramatic Metacrusis lasting for three semiquaver beats. An unusual character is given to this Metacrusis by the tempo pattern at the semiquaver beat level, which begins with an increase, encouraged by the syncopated rhythm in the left hand. This increase sustains tension for a moment before decrease in both tempo and dynamics allows the completion of Metacrusis (note here the shape of Metacrusis in the graph which graphically shows this metacrustic stretch or local momentum increase in the context of an overall decrease of momentum). The motion cycle completes with a rather strong Anacrusis supported by an increase in both tempo and dynamics. This makes possible a strong articulation at the middle of the bar, which is otherwise undermined by the absence of a melodic note. After another prolonged Metacrusis supported by the same "Z" tempo pattern at the lower beat level, the phrase ends very inconspicuously through decreasing tempo-dynamic patterns.

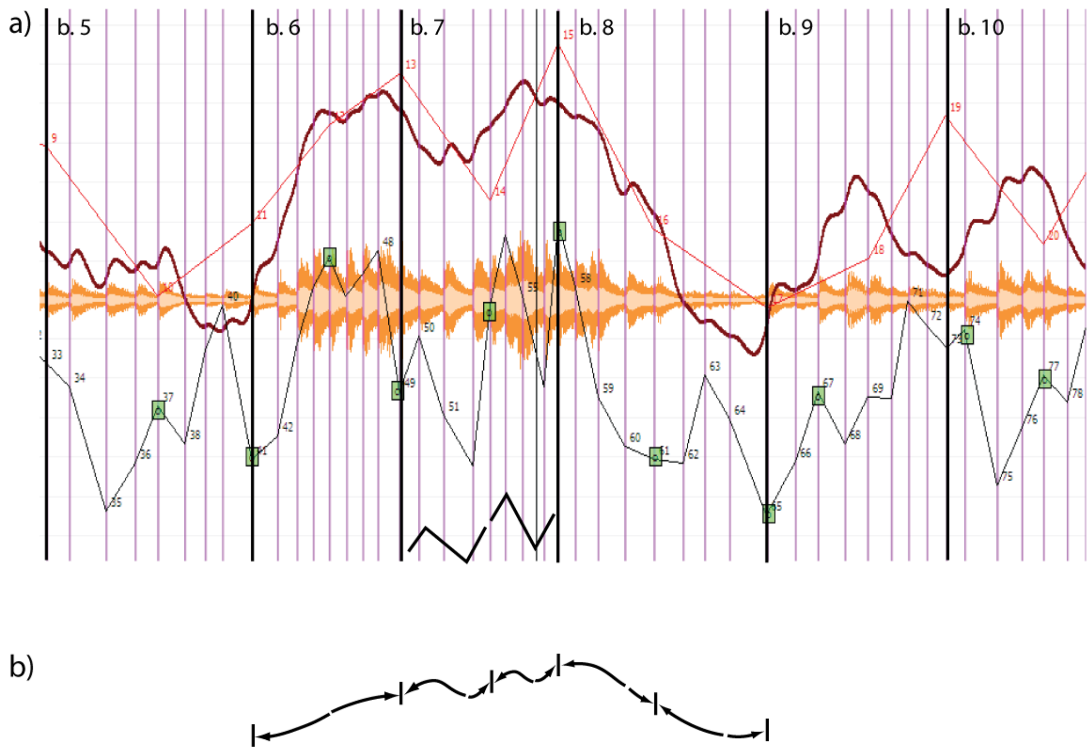

Figure 5.7 Cortot's performance of bars 5-9 of Chopin's Etude in E. a) two tempo graphs at the semiquaver and crotchet beat level and a dynamic graph; b) motion graph. (*Media Example 5.6* SV video capture of Figure 5.7a.)

While in the above case local tempo increase functioned to delay the decrease of momentum of a Metacrusis, in the following, where tempo increase continues to form part of an IN-AN phase, it has a different effect. This is often seen at the beginning of a new phrase, such as the ones in bar 6 and 9 in Figure 5.7 and bar 14 in Figure 5.5, when a tempo increase right from the beginning weakens the initial expected Metacrusis and gives the phrase a more confident forward-directed beginning. Compare the character of those motion cycle beginnings that begin with a tempo drop with those that begin with a tempo increase. The former are much more common, giving a pleasing elasticity to the beginning accents (unless this delay is overdone and is combined with dynamic stresses, in which case you move from an elastic to a stretching effect—recall Cortot's beginning of bar 15 discussed above). The latter, giving a more "springing" character to the accents, can occur quite often too and are generally part of specific performers' style of playing. Consider for example Vladimir Ashkenazy's and Andrei Gabrilov's performances of this Etude shown in Figures 5.8 and 5.9, where the use of this springing effect at metrical downbeats is part of a general consistent pattern, a very clear series of "∩" tempo patterns. In other words, in these performances, the choice of these patterns does not seem to play any structural role as is the case with Cortot’s performance, but it’s part of their performing style or the general effect they want to convey. A characteristic and rather extreme case of the use of tempo increase at key structural moments of a piece can be found on the downbeat of bar 16 in Cortot’s performance shown in Figure 5.5. At this moment in the phrase, after the melodic sequence in the previous bars, a sudden and steep tempo increase appears to be almost necessary in order to propel the energy forward and drive triumphantly into the melodic climax on the downbeat of bar 17 (notice how, in the motion graph of Figure 5.5, I chose to omit the initial Metacrusis, which has been significantly weakened, in order to emphasise the forward-moving character of the whole bar).

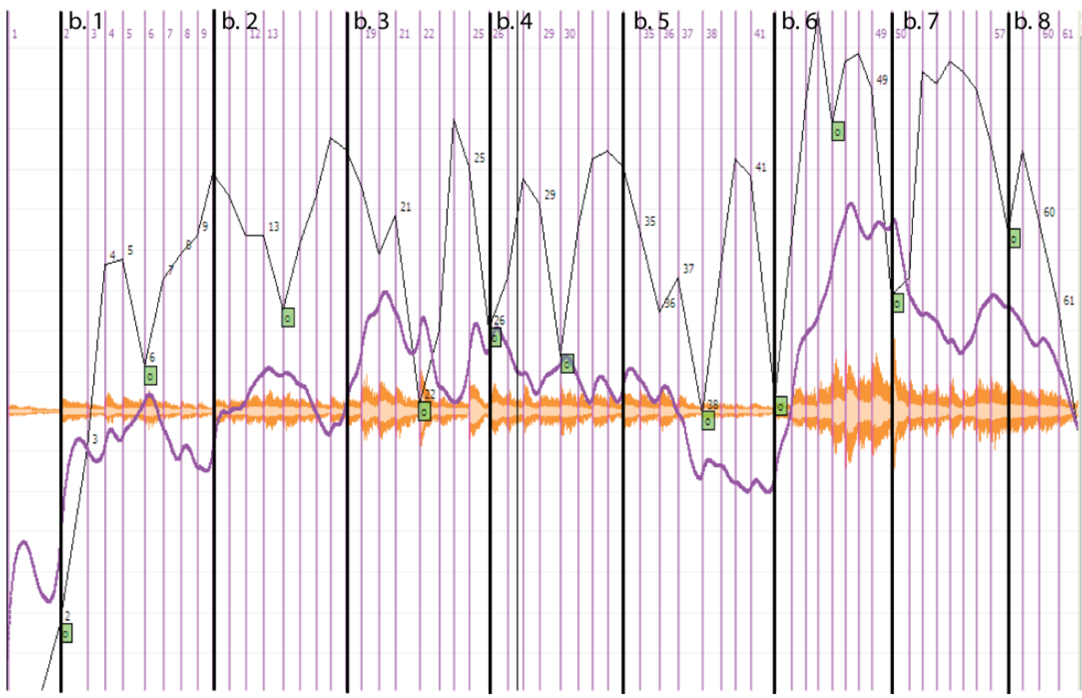

Figure 5.8 Vladimir Ashkenazy’s 1972 performance of the beginning seven bars of Chopin’s Etude in E: tempo graph at the semiquaver beat level and dynamic graph. (*Media Example 5.7* SV video capture of Figure 5.8.)

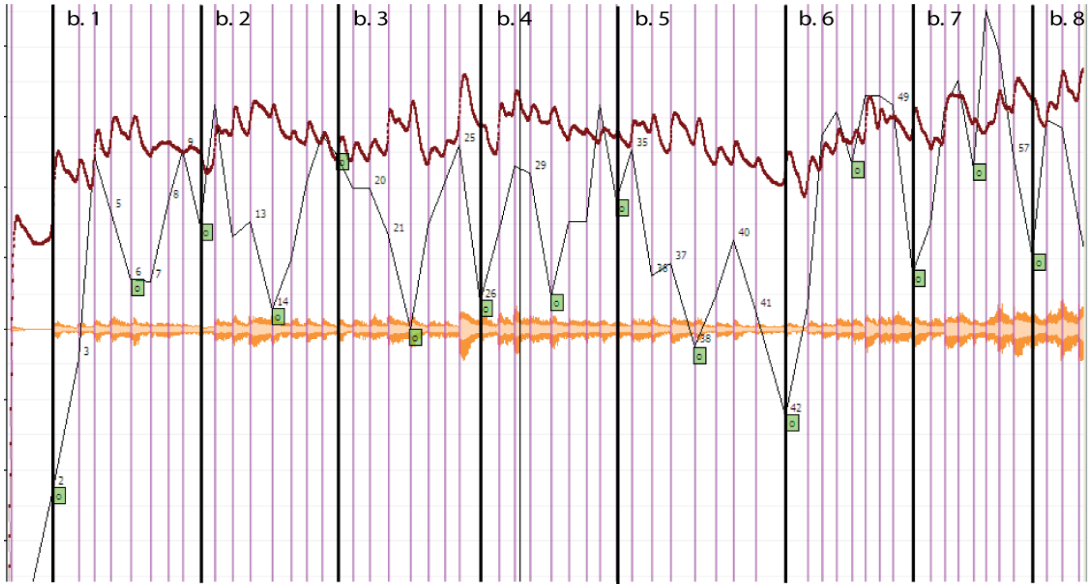

Figure 5.9 Andrei Gavrilov's 1988 performance of the beginning seven bars of Chopin's Etude in E: tempo graph at the semiquaver beat level and dynamic graph. (*Media Example 5.8* SV video capture of Figure 5.9.)

Even more decisive to the character of motion cycle beginning accents is the way they are approached. Local tempo increase approaching downbeats gives a particular effect since it denies the more normative tempo drop which is necessary in order to prepare and give a more rounded character to the accent. The effect of this local tempo increase can range from mere affirmation to pure surprise. Cortot's approach of the very ending of the first phrase in bar 5 (see Figure 5.6) is given a rather affirmative and positive character: despite the general decrease of both tempo and dynamics in approaching the cadence, a tempo increase of two semiquaver beats right before the tonic chord along with a slight dynamic increase strengthens this cadence and denies a kind of closure that might sound a bit too premature (after all, it's only the beginning of the piece). This is in fact the way Ashkenazy chooses to shape this phrase, creating a clear dividing point between the first and second phrases (see Figure 5.8). In Ashkenazy's case, however, the very weak ending doesn't sound premature but quite logical and expected, given that this steep tempo decrease at the cadence is part of a consistent series of "∩" tempo patterns since the beginning of the piece.

Expectation is always crucial in the kind of effect experienced. Sudden and pronounced changes in any parametric value (especially when it involves change of direction) tend to create a surprise effect. In contrast to Cortot's tempo increase right before the end of the first phrase in the middle of bar 5, which lasted for two semiquaver beats, Paderewski's only one semiquaver-beat increase at the same point has more of a surprise effect (see BPs 45-46 in Figure 5.10). This is because at that point, right before the downbeat, listeners normally expect a drop of tempo, necessary in order to give the accent a more rounded and flexible character. The one extra beat of tempo increase in Cortot's interpretation we saw above (middle of bar 10; Figure 5.7) decreases the surprise effect as it gives time to the listener to prepare for this more unusual accent approach. When, however, such little surprises occur frequently in a given performance, as in this performance by Paderewski's, their effect is not as pronounced. As the passage after this cadence in bar 10 shows (see Media Example 5.9), such little surprises (i.e. tempo increases before downbeats) are part of his performance style or strategy, each playing a different role in the phrase. While the tempo increase in bar 5 signals the end of the first phrase, the series of tempo increases in bar 7 (as part of a series of "U" patterns lasting for two semiquavers) helps the phrase to move forward. Yet the same kind of "U" tempo patterns at the beginning of the third phrase in bars 9-10 do not so much help the phrase to move forward but have rather the opposite effect, since they break the continuity of an otherwise very flowing melodic line.

More extreme cases of a pure surprise effects can be seen in Figure 5.11, where Shura Cherkassky's very abrupt tempo increases catch the listener totally unprepared. This happens throughout the whole Chopin Prelude No17 in A♭, with the one on the downbeat of bar 37 being the most extreme. Since this is, as in Padereswki's case, part of his general performance style, it does not sound unjustified but rather becomes one of the most unique and enjoyable features of his interpretation: the listener is not "allowed" to expect anything but the unexpected. On the opposite extreme is perhaps Perahia's interpretation of Chopin's Etude in E (Figure 5.12), which seems to be always satisfying the listeners' expectations, while shaping expressively rich and balanced motion patterns.

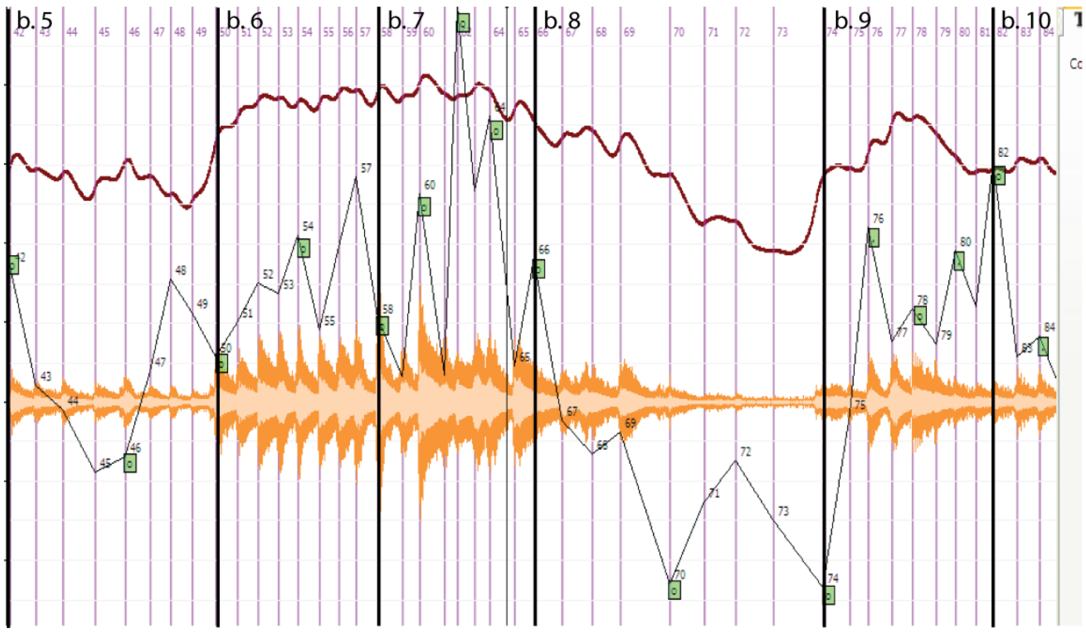

Figure 5.10 Tempo graph at the semiquaver beat level and dynamic graph of Ignace Paderewski's performance of Chopin's Etude in E, bars 5-10. (*Media Example 5.9* SV video capture of Figure 5.10.)

Perahia succeeds in energising the piece not by surprising but by masterfully stretching space-time within pleasurably expected limits. He never shapes flat and predictable motion cycles but always moves a bit ahead of the listener's expectation by balancing moderate stretching with forward movement. The approach of the cadence in the middle of bar 5 provides a good example for comparison (see Figure 5.12). What Perahia seems to be trying hard to avoid is a tempo/dynamic stretch that could result in an uncomfortable halt in the musical flow. Instead, a moderate metacrustic stretch at the beginning of bar 5 is very quickly and smoothly followed by a carefully measured forward motion that lands equally carefully on the following accent: an "S" tempo pattern with a pronounced initial tempo decrease combines with a dynamic pattern that strengthens the anacrustic phase of the motion cycle (see the increase in both tempo and dynamics during the middle part of the first half of bar 5), ending with a local decrease in both tempo and dynamics for a low-impact landing on the following downbeat. Variations of such patterns are used throughout the piece. ("S" tempo patterns seem to be Perahia's favourites; notice how in Figure 5.12 each crotchet beat is shaped by "S" tempo patterns.) These contrast highly with Cortot's favourite patterns, which tend to halt movement at the very beginning of each metric cycle. The beginning of his interpretation of this Chopin Etude is a characteristic case, where, as discussed above in relation to

Figure 5.6, syncopated accents at the beginning of each notated crotchet beat interrupt the expected flow of music.

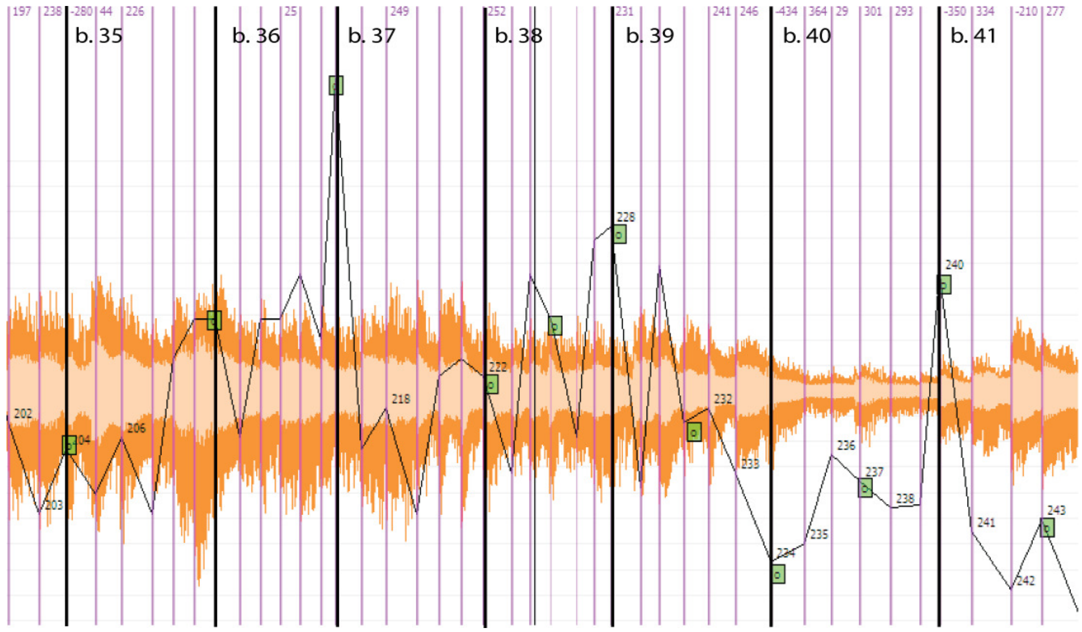

Figure 5.11 Tempo graph at the quaver beat level of Shura Cherkassky's performance of Chopin's Prelude No. 17, bars 35-40. (*Media Example 5.10* SV video capture of Figure 5.11.)

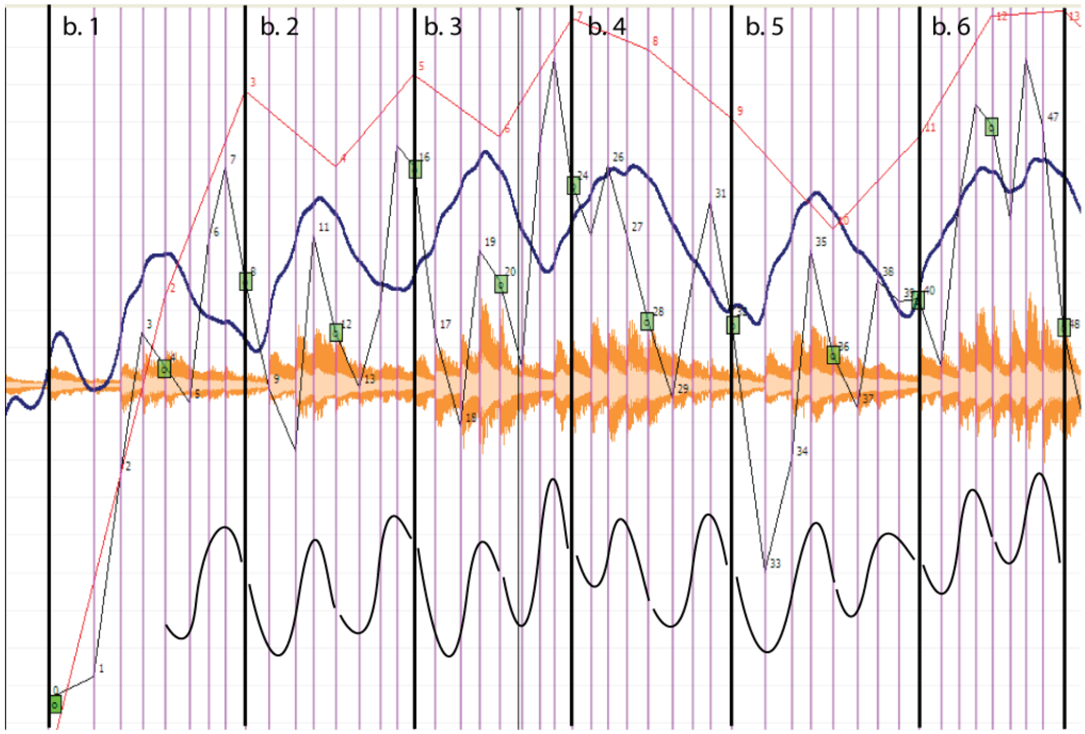

Figure 5.12 Murray Perahia's interpretation of Chopin's Etude in E, bars 1-7: tempo graphs at the crotchet and semiquaver beat level and dynamic graph. (*Media Example 5.11* SV video capture of Figure 5.12.)

One thing that becomes obvious from the above examples is that the expressive effect of a given tempo (or dynamic) pattern is dependent upon many different factors. To create an effect of increase of momentum, for example, it's not enough for a tempo pattern to increase. Increase or decrease of tempo patterns can function in different ways, depending on their specific properties and immediate context. We already saw an example above, where increase of tempo functions as part of a decrease of momentum process, and that was due to the dynamic pattern and compositional structure of the passage. Other influencing factors include how tempo is shaped at different structural levels at the same time as well as some of its more specific properties. While the degree of change of tempo is crucial (as Sherkassky's sudden tempo rise shown above demonstrates), its absolute value and relation to the average tempo of the piece are equally important. Consider Figure 5.5 one more time. Even though the degree of tempo change from BP 100 to 101 is greater than that of BP 108 and 109, the higher absolute values of the latter make their effect more forward driving, something that is further increased by their higher dynamic values. Similarly, even though BPs 109-110 are decelerating, the passage sounds more forward driving than, let's say, BPs 105-106, even though they accelerate. This is due both to absolute tempo values and dynamics. In general, moving at below average tempo tends to have more of a stretching feeling, while moving above the average creates more of an agitated feeling.

5.2 Isolating tempo and dynamics

When observing tempo, I always find it necessary to conceptualise and experience it as short patterns delimited by salient musical accents. That means that I am studying tempo structure in relation to other structural factors, in this case those responsible for these accents. Does that mean it's not possible or even meaningful to study tempo fluctuation in complete isolation? Desain and Honing believe that it's even harmful to do so. What's harmful is the notion of the tempo curve itself, "because it lulls its users into the false impression that it has a musical and psychological reality. There is no abstract tempo curve in the music nor is there a mental tempo curve in the head of a performer or listener. And any transformation or manipulation based on the implied characteristics of such a notion is doomed to fail."[236]

Even though it might be true that tempo curves do not quite have a psychological reality of their own, there are nevertheless a lot of useful things one can gather by studying their structure, even in isolation. Its eventual interpretation, however, should be done very carefully so that its proper interaction within the whole is taken into account. When I listen to music, I never conceptualise or experience tempo by itself in isolation, yet I am curious to know what this might mean. By using Sonic Visualiser one can try this out. For example, I can play a piece while visualising its tempo graph, which I have created. Even though what I experience is more than just the tempo fluctuation of the piece, this helps me become more aware of the structure and function of the tempo dimension. However, I can go a step further and isolate just the tempo graph. I can have Sonic Visualiser mute the actual music and play just the beat clicks of the tempo graph of a piece.

I try Murray Perahia's performance of Chopin's Etude in E. I mute the actual music and concentrate only on the abstracted tempo fluctuation. As I hear these clicks (and only the clicks), I first get a bit disoriented by their seemingly chaotic structure, until I begin to organise them, with some difficulty, into groups. It takes some conscious effort but I can eventually experience some degree of regularity in the fluctuating patterns. I find myself focusing particularly on those beats that slow down after an initial

[236] Desain and Honing, "Tempo curves considered harmful".

accelerating motion. When these moments occur at regular intervals, I get to expect the same pattern, which makes my body enter this regular movement cycle. When I align these clicks with the music and consult the tempo graph itself, I realise that these repeating patterns I hear are the "S" tempo patterns I had identified earlier while analysing these graphs in relation to the music (See the annotations on the bottom of Figure 5.12), which coincide with the crotchet beat structure of the piece. This is however, more of an exception, since in other performances, such as Cortot's, for example, where regularity and consistency of tempo patterns is reduced, it is much more difficult to organise mere tempo clicks into meaningful patterns.

The question now arises as to what the meaning of the experience of mere beat clicks extracted from someone's performance is. Is it the experience of tempo fluctuation I have every time I listen to the actual performance? It's definitely related but it doesn't seem to be the same. For one thing, these tempo clicks hardly feel meaningful in the sense that they don't feel like music at all: there is hardly any musical flow in this experience. For another, when I listen to this beat structure in the context of the music, other structural factors come into play to make these clicks group in a different way. What's common, however, between these isolated clicks and tempo fluctuation in the context of the music is the nature of this experience, which has to do with the way I try to make sense of them musically: like any piece of music, I experience these tempo clicks, whether in isolation or as part of the whole music, as motion cycles. That means that when I experience music as motion cycle experience, it is hard to single out just the contribution of tempo fluctuation and the so many other factors involved in this total motion experience. So, the answer is yes, I can experience and also study a tempo graph by itself but its meaning should be very carefully linked to the overall experience of the actual piece abstracted from.

What's useful for me to know is at least how tempo contributes to this total musical experience. And in order to understand that, I find it necessary first to study these tempo graphs in isolation. Recalling my experience of these tempo clicks, one of the main structural features of tempo fluctuation is its organisation into regular groups. This regular organisation is, of course, partly the result of my innate desire to group them so, but also partly due to a more objective organisation inherent in the structure itself. This can be seen just by looking at and measuring these tempo patterns themselves. Figure 5.13 shows just the tempo graph of Perahia's performance. By carefully observing the patterns involved, I can see that they occur in cycles of about every crotchet beat (both peaks and troughs occur consistently every four semiquaver beats—with a few exceptions where they occur after three beats—after which the following one resumes its expected place after 5 beats).[237] But where exactly each cycle begins and ends is not very obvious, if at all, from just looking at the graph.

It is only when experiencing this graph as a series of clicks that I get some clues about how to group them, something that of course could easily change in the context of the actual piece. I can easily test that, and in fact, the moments where I experience beginnings of motion cycles on the basis of these tempo clicks coincide largely with the motion experience of the actual piece. That tells me, at least as an informal observation, that there must be high correlation between the tempo and motion structures of the piece. This is no surprise, of course, knowing that one of the reasons performers manipulate tempo is in order to shape a well-articulated metric structure (unless the opposite effect is desired in special circumstances or specific genres). At the same time, I already know how big an influence the compositional structure of a piece is on performers, meaning that the specific compositional structure of a piece, including its metric structure, will have an influence on tempo fluctuation.

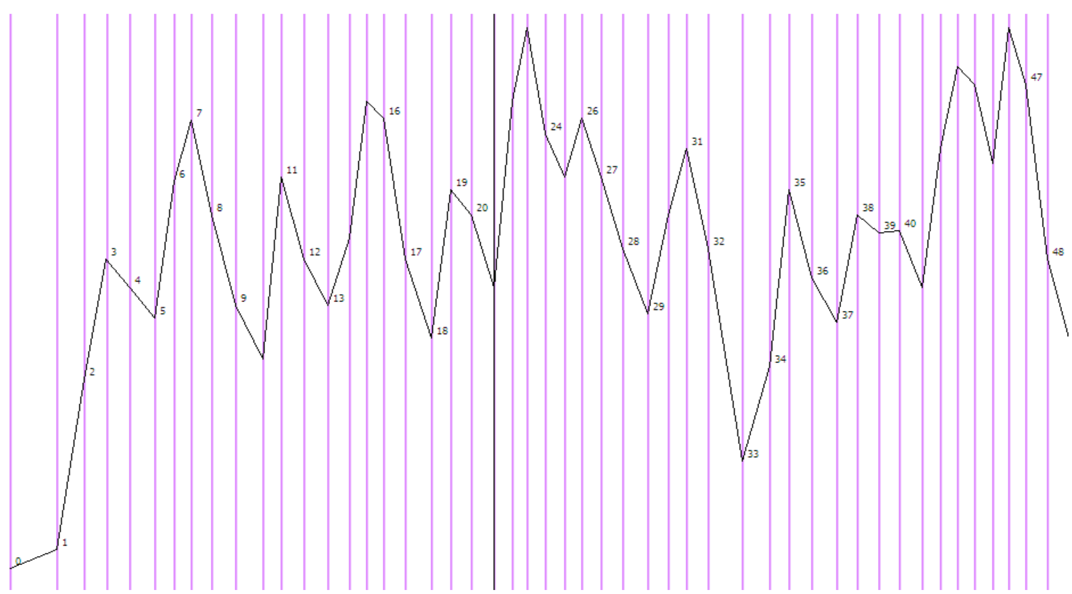

Figure 5.13 Tempo fluctuation graph at the semiquaver beat level of Murray Perahia's performance of Chopin's Etude in E, bars 1-5. (*Media Example 5.12* Semiquaver beat level clicks of Perahia's performance of Chopin's Etude in E, bars 1-5.)

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[237] Peaks in Perahia's performance shown in Figure 5.13: BPs 3,7,11,15,19,23,26,31,35,38, 42, 45; and troughs: BPs 0,5,10,13,18,21,25,29,33,37,41,45.

When I mark the beginnings of experienced motion cycles on this graph (which in Perahia's performance are consistently at the beginning of every notated crotchet beat),[238] I can see that the tempo patterns articulated are, with only one exception, all of the "S" type (see the annotation at the bottom of Figure 5.12.) That makes me wonder whether there is something about the structure of the specific piece that encourages this, or whether "S" patterns are very common and preferred in general. From all the experience I've had with analysing tempo graphs, I've seen that "S" patterns are the most common indeed. However, other more unconventional performances, such as those of Cortot's, do not show such a uniform tempo pattern structure but use a variety of tempo patterns in a very unpredictable order. But then, performances such as Ashkenazy's, which show a tempo structure of extreme uniformity and predictability, do not make use of "S" but "∩" tempo patterns. And the list goes with no end, each performer shapes a unique tempo structure and it seems to be very hard to predict what performers would do. One could even argue that it's really not so important to know what the most common tempo pattern is but the effect of each specific pattern.

Yet, one is curious to know what the most common or likely way of shaping music or a particular piece is and why. Bruno Repp has made some interesting quantitative analytical studies of this Chopin Etude in an attempt to discover various "timing strategies".[239] His so called "grand average" timing profile of the first five bars of the Etude is particularly revealing (see Figure 5.14). It confirms the rather informal observation I made above: that, at least in the first five bars of this piece, "S" tempo patterns seem to be the preferred or most common timing strategy. What remains to be discovered is whether it's the particular compositional structure of the piece that demands this, or whether "S" patterns for some reason are more common in general.

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[238] Note that this is not always the case as Cortot's displaced accents we saw above show.
[239] Repp, "A microcosm of musical expression: I", and "A microcosm of musical expression: II."

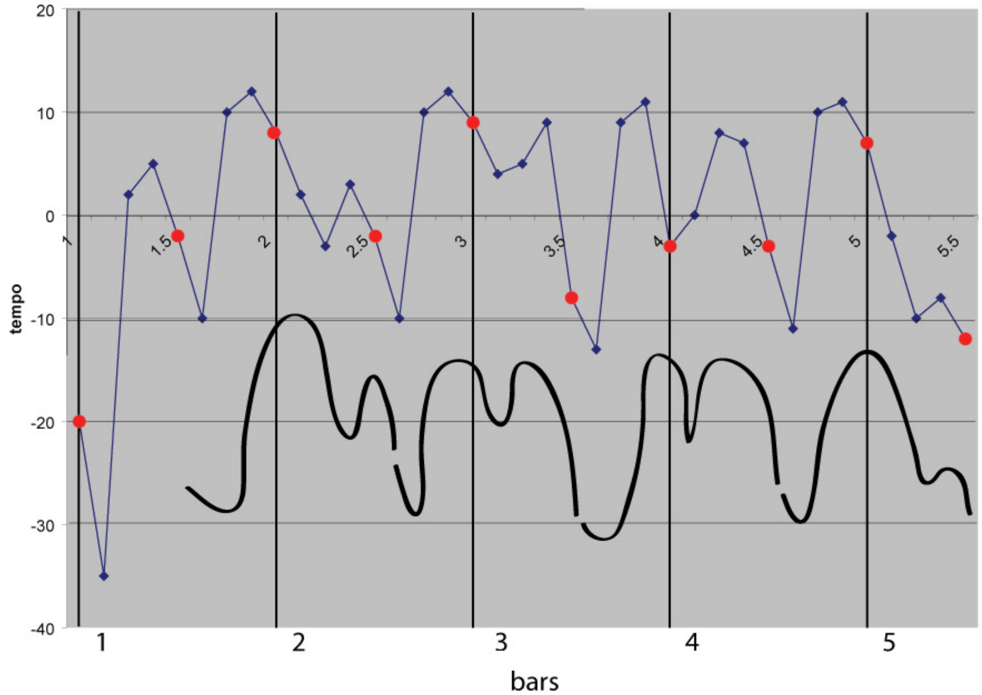

Figure 5.14 Bruno Repp's "grand average" timing profile of the first five bars of 115 commercially recorded performances of Chopin's Etude in E, with added tempo patterns below.[240]

To thoroughly answer this question, I would need to make similar quantitative analyses of large sections of a variety of different pieces. However, since this is beyond the scope of this thesis, some hypotheses will be made based on selected analyses of pieces, some of which will be discussed here. What musical structure in general seems to clearly demand is that each phrase is shaped by an arch-like tempo pattern. This can be confirmed by even a casual look at the phrase level of many tempo graphs.[241] This is also in agreement with Neil Todd's computational model of expressive timing in tonal music, which involves not only tempo but also dynamics: as performers move into the phrase, they play faster and louder, and as they approach its end, they play slower and softer.[242] What's of interest to us here is that at the boundaries of these phrases, where the tempo

[240] This graph here is a reproduction of Repp's original graph in a way that represents tempo fluctuation in the manner used in this thesis, that is, by showing tempo in relation to time, and not beat duration in relation to time as in Repp's representation. As a result this graph here looks like Repp's graph except upside down.
[241] This is not to say that there are no exceptions to this observation but that it is a very common structural feature.
[242] See Todd, "A model of expressive timing in tonal music" and "The dynamics of dynamics: a model of musical expression." While this phenomenon of phrase arching can be observed in many performances and might be considered a general principle, it is nevertheless a historical construction, most commonly observed after the Second World War (see Cook, "Objective expression"). My work here does not make any effort to examine the historical aspect of performance expression (which is Cook's goal) but to look at it from a more synchronic point of view, exploring the different options performers have and their corresponding embodied meaning.

level usually drops to its lowest point, “S” patterns seem to be less common. When a new motion cycle at the phrase level begins (in this piece that would be bars 1, 6, 9 and 14), the very characteristic tempo drop of the “S” pattern is not normally present. Figure 5.15 shows a rather typical boundary between two phrases featuring this absence of a tempo drop at that point. At the beginning of the new phrase, emphasis is achieved instead by the tempo drop before, and the slight dynamic stress on the downbeat by the performer. The general idea of such phrase boundaries, however, is to allow the new phrase to emerge subtly through the gradual increase of Musical Momentum and not through a local emphasis.

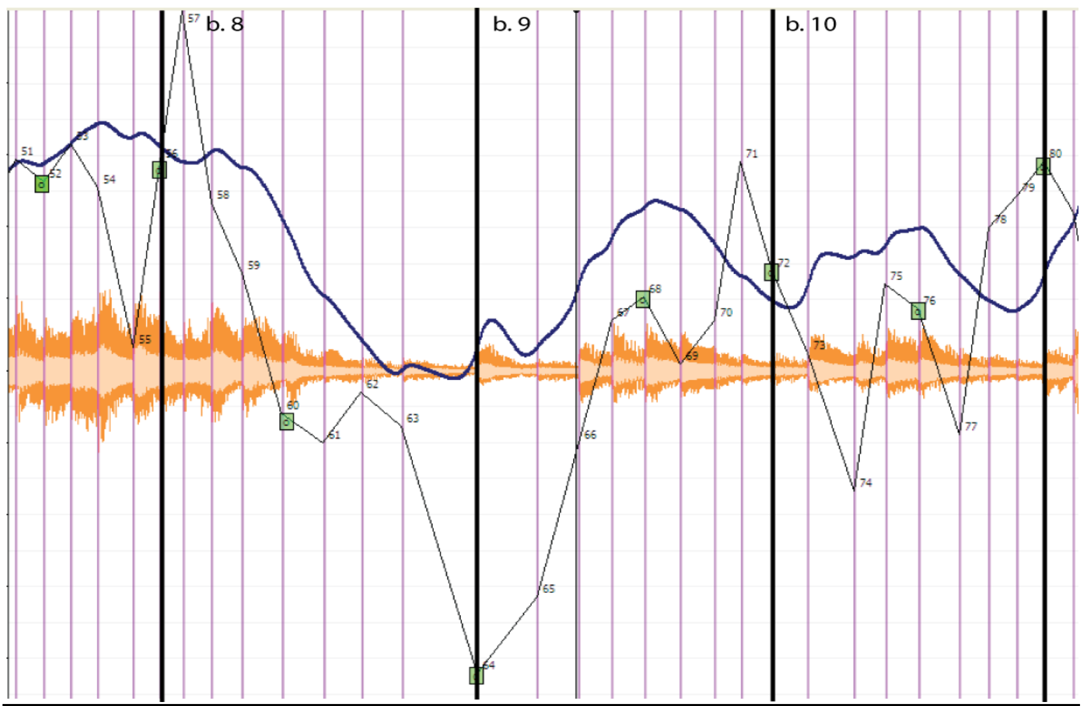

Figure 5.15 Boundary between two phrases in Perahia’s performance of Chopin’s Etude in E. (*Media Example 5.13* SV video capture of Figure 5.15.)

A similar absence of the “S” pattern is also seen in other places in this piece. One such case is the downbeat of bar 4, shown clearly in Repp’s grand average timing graph (Figure 5.14). If all of those performers tend to avoid a tempo drop after the downbeat of bar 4, then this means that there must be something in the compositional structure at that point that encourages it. It’s not difficult to observe that the phrase structure at that point demands a more continuous line: while in the first two bars we have two short independent motivic ideas, in the following two, similar motivic ideas join together to provide a more continuous melodic gesture. Thus the avoidance of the tempo delay on the downbeat of bar 4 serves to create a more continuous motion across bars 3 and 4. The absence of a tempo drop is not the only change in the tempo patterns, however. To shape the middle of bar 3 to the middle of bar 4 as one continuous gesture or motion, the large-scale tempo pattern is shaped in an arched-like fashion: that is, an "S" joins together with an "∩" tempo pattern, creating an overall tempo arch ("∩") with a lower-level tempo drop in the middle (a sort of "M" pattern; see the freehand drawing I added in Figure 5.14). This minimises the strength of the first "S" pattern to avoid a strong emphasis into bar 4. Similar larger-scale arched tempo patterns occur in the rest of these five bars in Fig. 5.14: from the middle of each bar to the middle of the following one. What's interesting is that at this tempo level, these tempo arches do not align with melodic phrasing (as is the case at higher levels of musical structure) or with the notated metric structure, but cut across them, helping thus to create a more flowing connection between the phrases.

In all of these cases, the joining of two "S" patterns into a larger-scale arch minimises the emphasis in the middle of this arch. Every case is different, of course, and the particular way two tempo patterns connect together (in addition to the specific context they appear) is very important in shaping large-scale gestural units. Figure 5.16 attempts to organise the way two "S" tempo patterns of different proportions connect in relation to how they contribute to the shaping of gestures at different structural levels. The general idea is that such connections can range from the articulation of two independent successive gestures of equal status (such as Figure 5.16a), to the articulation of one continuous and smooth gesture at the higher-level structure (such as Figure 16d), with various intermediate situations of which two common ones are shown at b and c. Generally, the higher the beginning of the second tempo pattern the less emphasis that moment receives; this emphasis also depends on the relative amount of tempo delay before and after this moment. Note how, while at d we no longer have two "S" patterns (and at c we have only one), the way I understand the origin of these patterns (in the context of this specific piece, which is dominated by "S" tempo patterns) is as smoothed-out "S" patterns.

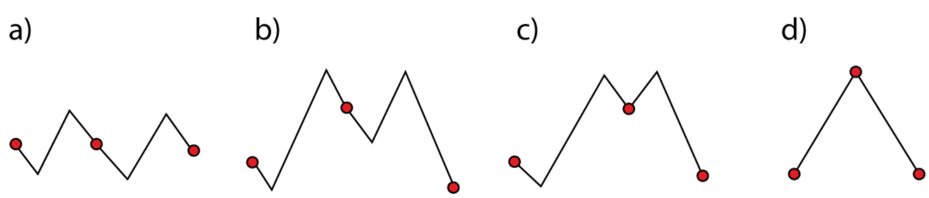

Figure 5.16 "S"-pattern connections shaping higher-level arched gestures.

One can trace the way tempo patterns connect with each other to shape such higher-level tempo patterns in actual pieces. Figures 5.17 and 5.18 show two excerpts from Horowitz's performance of the Chopin Etude, the opening phrase and its identical return in bar 9. When emphasis at the crotchet-beat level is desired, type a is used as at BPs 20-28 and 84-92. This coincides with the melodic climaxes (at the middle of bars 3 and 11) creating two consecutive emphases through pronounced tempo drops at 20/24 and 84/88. Note how this is different from the average tempo profile of Figure 5.14, where the downbeat (bar 4) after the melodic climax is not given as much emphasis, allowing the passage to move more freely than in Horowitz's insistence on this moments. In other places, he chooses some of the other pattern connection types so that a more flowing motion is achieved. What's interesting is that, as he approaches the melodic climax in both phrases, he moves one step ahead in the pattern series of Figure 5.16, achieving a more continuous flow into the climax around the middle of the phrase (see types c and d in the first phrases and b and c in the second). Noteworthy is also the way Horowitz shapes the passage after the climax: in both phrases he connects half-bar tempo patterns in such a way as to create a large scale arch as shown by the free-hand curve in Figures 5.17 and 5.18 (this can also be seen by the shape the green squares at the beginnings of these tempo patterns create from BPs 20 to 40 and from BPs 88 to 104, marked x and y respectively).

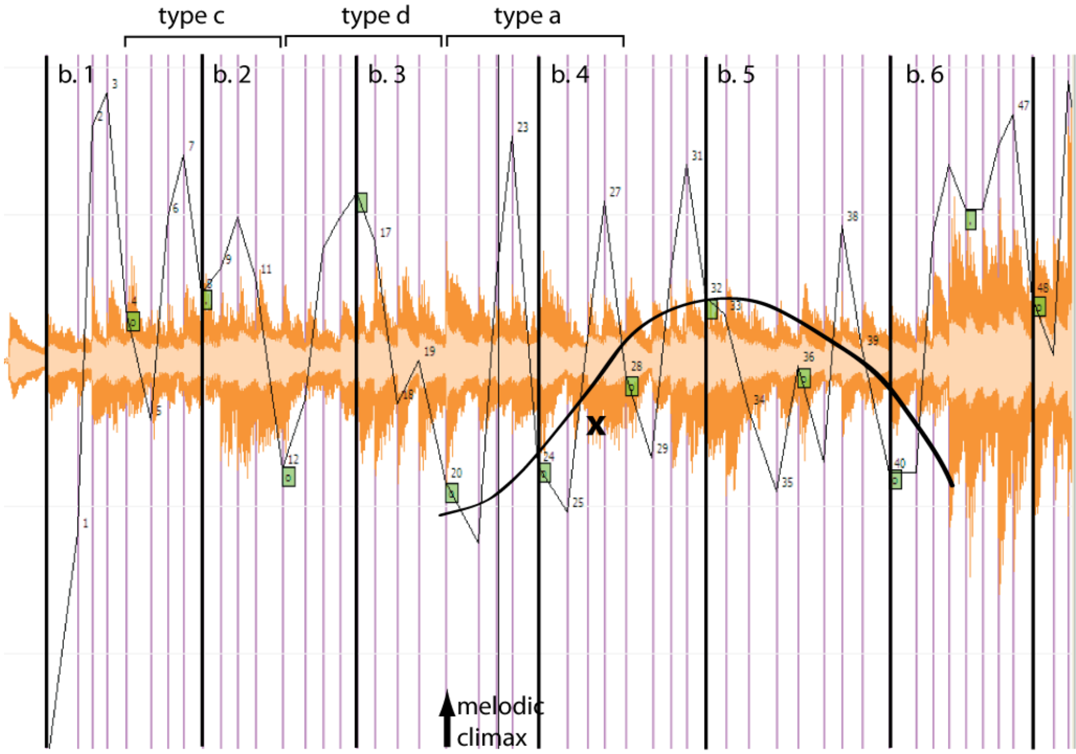

Figure 5.17 Tempo graph at the semiquaver beat level of Horowitz's performance of bars 1-6 of Chopin's Etude in E. (*Media Example 5.14* SV video capture of Figure 5.17.)

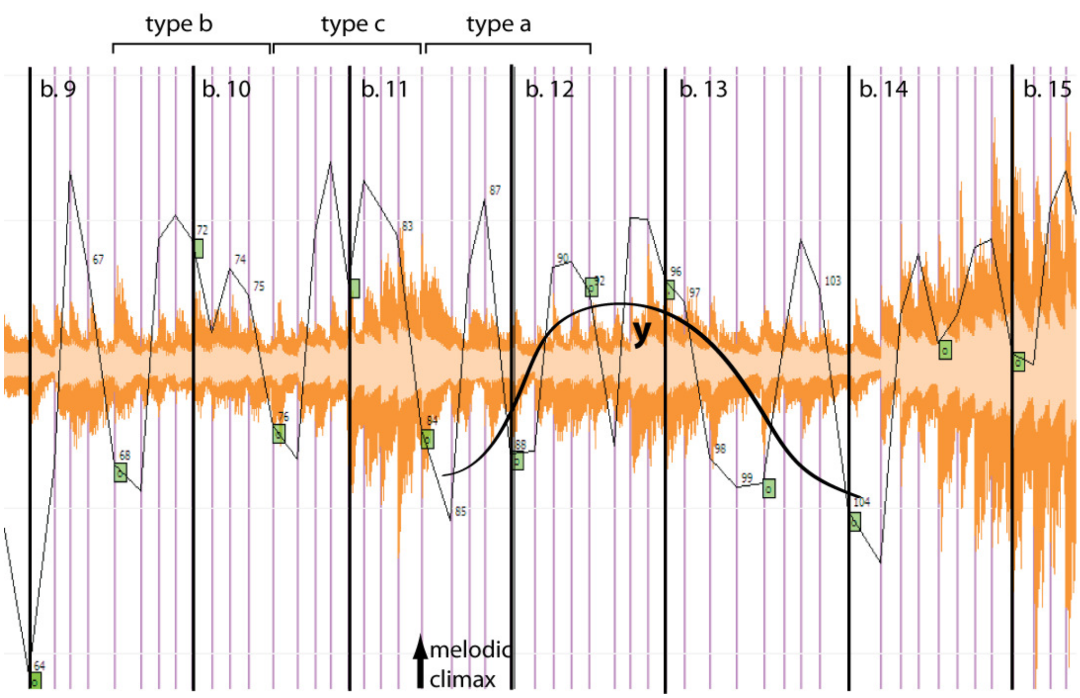

Figure 5.18 Tempo graph at the semiquaver beat level of Horowitz's performance of bars 9-14 of Chopin's Etude in E. (*Media Example 5.15* SV video capture of Figure 5.18.)

In Figure 5.19 we have the reverse process of the one shown in Figure 5.16. While in the former we had tempo pattern connections that created higher-level arches, here we have connections that shape "valleys". As we move from a to d, the strength of articulation decreases in order to shape, as above, smoother connections between the two tempo patterns. Figure 5.16 referred to overall gestures aligned with relatively low-level metric cycles, while Figure 5.19 refers to connections that align with higher-level phrase boundaries such as the one discussed in relation to Figure 5.15. As stressed above, the importance of these figures is the way they understand local connections as part of larger patterns, and more specifically, as a series of connected "S" patterns (or variations of these) of varying proportions. At the same time they are understood in relation to the broader structural context, particularly that of the compositional structure, which, as hypothesised, exerts significant influence on tempo fluctuation.

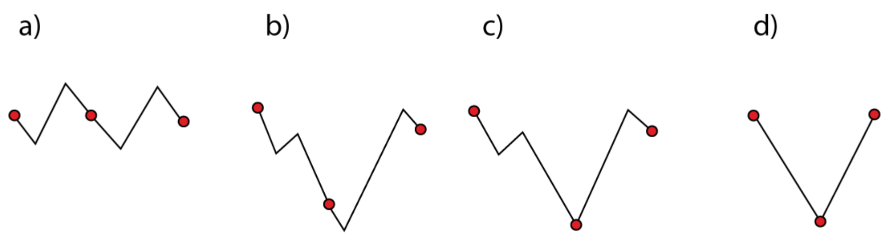

Figure 5.19 "S"-pattern connections shaping smooth phrase boundaries .

Thus, based on all of the above observations about how an average tempo graph correlates with compositional structure, it might seem that it is possible to make a strong prediction about how the tempo graph of an "average" performance might look. (I should note here that my predictions are the result of observations made not only on the examples discussed here but on many other pieces.) Unfortunately (or fortunately!), however, the compositional structure is not the only influencing factor. Cultural factors make performers perform certain pieces in specific ways. They know that waltzes, for example, are supposed to be played in a certain way, which means that "S" tempo patterns will no longer be the norm but instead "U" and "Z" patterns (recall the discussion in Chapter 3 of these patterns in relation to the Waltz and the Mazurka). Similarly other complex factors are involved that influence performers' choices, including personal idiosyncrasies and tastes, school of training and specific performance circumstances.

But even when I have succeeded in determining the average performance of any given piece and style, in what way is it useful to me? And what exactly is the meaning of such average graphs? As we will see in the epilogue, a number of practical applications are possible that could make use of such analytical observations. By knowing how humans respond to the compositional structure of music and how they tend to flex time and dynamics we could program a computer, for example, to perform pieces automatically.[243] That's not only an exciting thing in itself but also a test in seeing how well we theorists have succeeded in understanding expression in performance. Or the reverse: by analysing tempo and dynamic fluctuation graphs of specific music performances (i.e. of sound files of pieces with no access to the musical score), we could make useful predictions about certain aspects of the compositional structure of the music or of the listener's expressive movement reactions (which itself can have a number of interesting practical applications.)[244] Moreover, performance expression, both from the performer's and the listener's point of view, might be meaningfully understood as deviations from such average expressive choices as opposed to the questionably meaningful approach of considering how it deviates from a metronomically strict tempo (flat tempo line).[245]

As already suggested, average graphs, even though a bit totalising and impersonal, can signify interesting things about performance expression. In trying to understand their meaning in relation to musical performance in general, I find it necessary to stop for a moment and make a few distinctions and comparisons among various related concepts I have been working with so far, which can easily be confused and conflated. To understand musical performance I've been classifying the influencing factors into three main categories: our innate perceptual and biological faculties, the compositional structure and the cultural or learned factors. I used the first to come up, for example, with certain patterns that I considered "prototypical", in order to have a reference point with which to make meaningful comparisons and derive meaning. Those patterns were the simplest, most conflict-free and unrefined patterns that reflect our most basic bodily movements and perceptions, such as the regular series of walking, breathing or heart-beating cycles. Then, the idea of the "expressive potential" reflects the influence of the compositional structure on performers' choices. But even here, human perception cannot be ruled out since the compositional structure by itself cannot have meaning if not

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[243] A few programs do exist in doing this such as the *SuperConductor* by Manfred Clynes (http://www.microsoundmusic.com/) and one by SilporMusic (http://www.silpormusic.com/) (last accessed 14 Sept 2011).

[244] For example, one could develop a computer program that takes the sound file of a piece of music as input, automatically analyses its dynamic and tempo fluctuation and produces some kind of visualisation that captures expressive movement (Windows Media Player used to provide such visualisations with the music played, but those weren't particularly sensitive to the expressive structure of music).

[245] See Cook, "Changing the musical object".

perceived by humans. For theoretical purposes, I could imagine an idealised kind of performance where only the first two above categories are involved—the compositional structure and our basic innate (common to most people) perceptual faculties. That would be a performance most faithful (or, as I described it in the previous chapter, "passive") to the compositional structure (or the expressive potential) of the piece, but one perhaps not fully satisfying to our trained ears, which have learned to expect and enjoy performances that have been influenced by specific cultural contexts. I can imagine a computer generating such performances, lacking much creativity in the way the score is performed. "Average" performances, by contrast, take into account all three influencing categories since they average up actual performances of pieces. Even though I haven't personally heard how such a performance might sound like, I can speculate that it sounds quite satisfactory, even professional, perhaps a bit conservative, lacking the idiosyncrasy and eccentricity desired by a lot of adventurous ears.[246]

So far in this section, I've mostly dealt with tempo graphs. Dynamic graphs are equally interesting and important, but, as we will see, they will need to be treated and interpreted in their own way. Even though I find the waveform of the sound file quite helpful in visualising dynamic information, the graphs that one can generate in Sonic Visualiser can be particularly helpful especially when I wish to smooth out some of the surface details of these dynamic values. Unlike tempo graphs, which are constructed by single values for each beat duration, dynamic graphs provide a continuous stream of changing values. Even for a single note, the dynamic fluctuation can be quite significant but in all cases what's more important is usually the peak value. I tend to produce dynamic graphs that leave some note-level fluctuation, since that can be useful at times. However, what's of most interest to me here are dynamic processes at the motive and higher levels of structure.

Having the dynamic graph available for visualisation makes me wonder, as with tempo graphs, to what extent dynamic fluctuation can be experienced in isolation and what this experience might be like. It's actually not hard to imagine what this would be like: I can easily imagine such a graph as a single continuous stream of same-pitch sound of constantly changing dynamic value. As I already discussed in the previous chapter, as dynamic volume (when considered in isolation from other structural parameters) increases or decreases, I experience increase or decrease of MT (as well as of RD to a

[246] In fact, in an experiment conducted by Bruno Repp, with the goal of assessing the aesthetic quality of a quantitatively average music performance, with emphasis on tempo and timing, he found that an expert average performance can sound more appealing than the majority of the performances that go into the average. See Repp, "The aesthetic quality of a quantitatively average music performance".

lesser degree) respectively. Apart from this general correlation, other important processes influence the way motions shape at different levels of structure: at the note-to-note level of structure, sudden and relatively strong increases or decreases of dynamic values have an important accent-inducing function that can lead into shaping higher-level motion cycle beginnings. At higher levels of structure, arch-shaped dynamic process also tend to shape higher-level motion patterns—in this case dynamic troughs coinciding with cycle beginnings.

A study of dynamic graphs of actual performances will reveal more about their relation to compositional structure and experience. Dynamic as well as tempo graphs of Claudio Arrau's performance of Chopin's Nocturne in E♭, op.9, No.2 (Figure 5.20) are shown in Figure 5.21. The dynamic graph of this example is a rather typical example of how, while at relatively higher levels of structure dynamic patterns tend to show a well articulated pattern of arches (see the arches drawn above the dynamic graph), at lower levels of structure we see a less regular articulation. My first guess is that this is because dynamic fluctuation is less dependent on beat/metric structure than is the case with tempo fluctuation. Unlike tempo fluctuation, which can more easily be experienced by itself as bodily cycles of movement, dynamic fluctuation cannot be easily separated from the sound or the notes we hear.[247] Therefore, one would expect that dynamic fluctuation would be controlled more by the notes themselves—that is, in this case, particularly by the melodic line and its different properties. Examining the various arch-like patterns of the dynamic graph of Figure 5.21 (and of the rest of the piece not shown here) shows that they align quite consistently with motivic and phrase groups. Thus, the length of these dynamic patterns depends mostly on the length of melodic groups, which in this piece is usually one or two bars long. After closely observing the dynamic graphs of several performances of different pieces we can safely begin to generalise: in addition to the more general tendency to shape each melodic group with arch-like dynamic patterns, there is a tendency to emphasise specific melodic notes either through pronounced dynamic increase or decrease.

[247] Or to put it in Repp's words, "dynamic patterns are part of the sound structure itself. They are a part of what is unfolding, whereas timing governs how this unfolding is taking place." See Repp, "A microcosm of musical expression: II", p.1982.

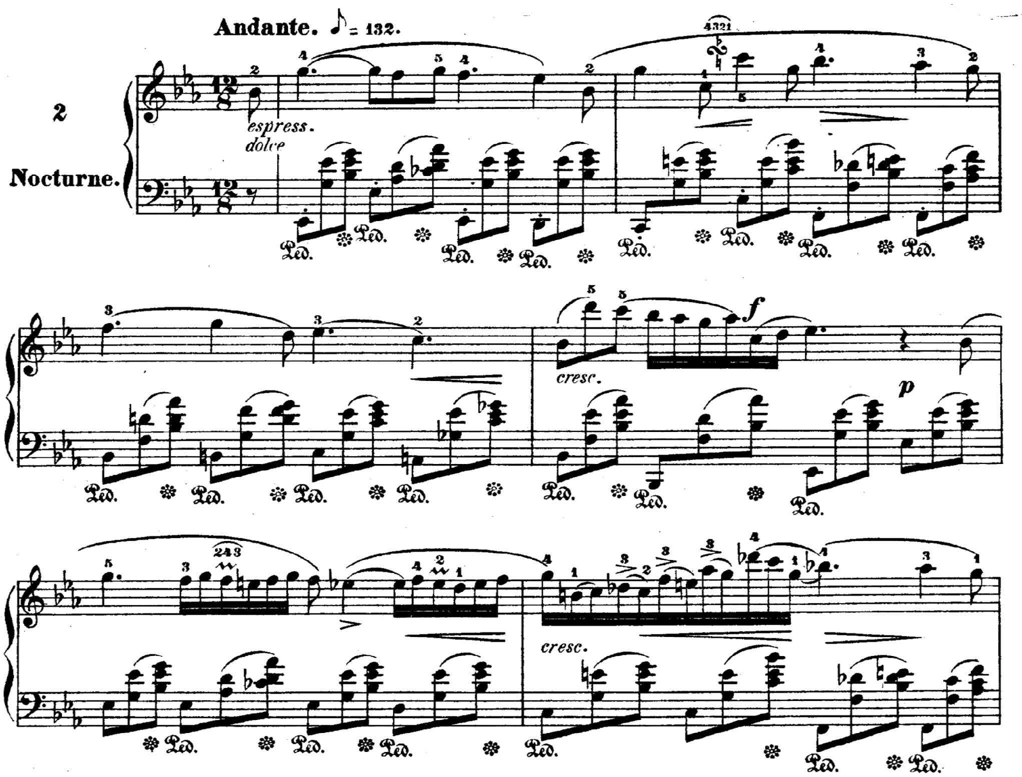

Figure 5.20 Chopin's Nocturne in E♭, Op.9, No.2, bars 1-6.

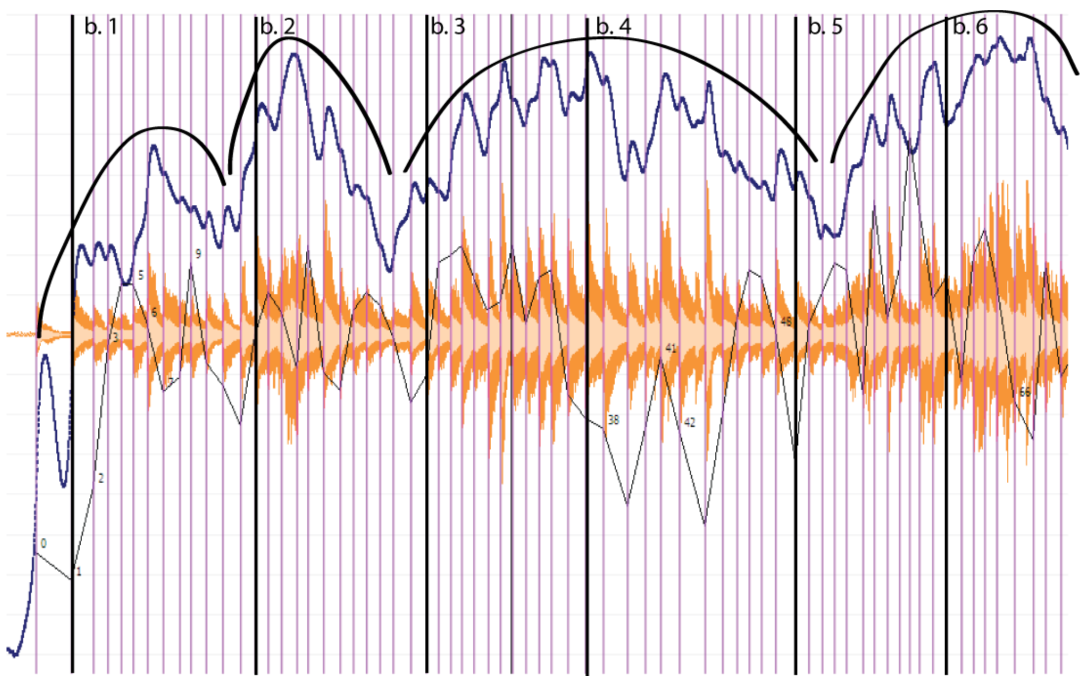

Figure 5.21 Claudio Arrau's performance of Chopin's Nocturne in E♭, Op. 9, No. 2, bars 1-6. (*Media Example 5.16* SV video capture of Figure 5.21.)

Local emphases may serve both to help maintain a good sense of metric feeling and to give special expressive character to selected melodic moments. The opening ascending melodic gesture, for example, which repeats two more times in the second bar, is played with a dynamic stress on the second longer note in order both to give a confident character to the gesture and to help establish a strong metric feeling. The dotted-crotchet-level pulse is further strengthened in the third bar through dynamic stresses at the beginnings of each of these beats. Such dynamic stresses are, however, chosen very carefully so as not to create an undesired metric squareness. Dynamic stresses on weak beats balance these out and maintain a good sense of melodic flow. Note especially the melodic G on the sixth quaver of both the first and second bars which, occurring together with tempo stretches, give a special character to the melodic appoggiaturas as they signal the end of these phrases. Equally significant and expressively powerful are sudden and unexpected dynamic un-stresses. Particularly striking is the beginning of the second phrase (bars 4-5), which, unlike the first time, emphasises the ascending melodic gesture through marked decrease of dynamics. The same strategy is also very common at important climactic moments, where we normally expect higher dynamic values. Consider, for example, the high D near the beginning of bar 4, which stands out not only due to its sudden melodic leap but also due to its unexpectedly low dynamic value.

What's obvious from the above brief discussion of the way Claudio Arrau shapes dynamic values is that it's very hard to come up with hard and fast rules about why, how and when performers do what, and that's not surprising given the very subjective and creative nature of musical performance. And while my main goal here is not so much to decode creativity in performance but to understand the expressive meaning of this performance in relation to movement, I will remain for a bit longer on this, hoping it might enrich my understanding of music performance in general. I will return to the Chopin Etude in E and take a look at Repp's empirical results on dynamic values this time. His grand average dynamic profile of 117 different expert performances of the first five bars of this piece is shown in Figure 5.22. It's interesting to see that while performers are free to express themselves in all kinds of different creative ways, their performances tend to converge on certain patterns. What's striking in this graph is the regularity with which the patterns unfold, something that as I tried to generalise above is not very typical of dynamic graphs. It's not typical because, as I hypothesised, dynamic fluctuation is not so much meter influenced but more melodic structure influenced. And it is only when melodic structure itself shows particular regularity, as in this case, that this is the case.

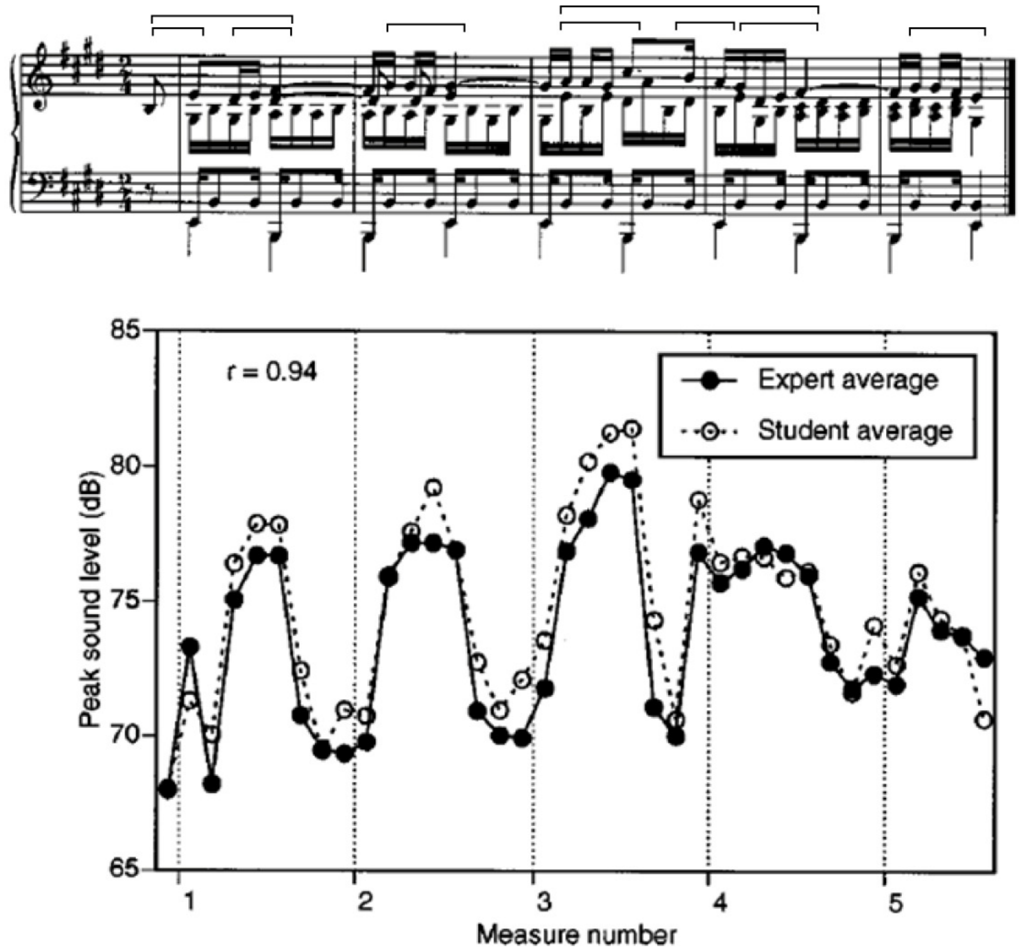

Figure 5.22 Reproduction of Repp's Fig. 1 showing the grand average (global) dynamic profile of 117 expert performances of the first five bars of Chopin's Etude in E (black-dot graph).[248]

Melodic structure here, at the three-to-six note level, is highly dependent on rhythm and by extension on meter. Thus, each of the five repetitions of the initial motivic idea in these five bars points anacrustically to a long, metrically accented note followed by a four-note answer in the accompaniment. This regular pattern, which is only briefly modified in bar three through the addition of two extra melodic notes (see my bracket annotation above Repp's figure), seems to be responsible for the regular dynamic patterns. Particularly interesting is the way the ∩-shaped dynamic patterns of the melodic phrases are answered and balanced by the reverse U-shaped ones of the accompanimental figurations. Another interesting observation, which can be made in dynamic graphs of a variety of other pieces, is the way performers tend to emphasise the strong beat or

[248] See Repp "Microcosm of musical expression: II."

downbeat through minor decrease of dynamic value. This strategy is not unlike the way performers tend to decrease tempo right before beginnings of metric cycles, in both cases articulating accents of a more rounded character. As always of course, it depends on the style of the piece and the general character a performer might wish to give to the piece. For a slow and lyric piece like this, more rounded accents are more appropriate. In a fast, more dance-like piece, more "edgy" cycle beginnings might be desired.

Given both dynamic and tempo fluctuation graphs of a performance of some unknown piece, one could now make much stronger predictions about its compositional structure. Even though one cannot make guesses about the actual notes, one can still make predictions about general structural features such as metric or phrase (boundary) structures, and perhaps about the expressive potential of its compositional structure. Such predictions can be made with more confidence when we have available average graphs such as the one produced by Repp, since it's by studying these graphs that we are able to come up with more general rules of performance. Apart from Todd's general observation that arch-like patterns in both tempo and dynamics at mid-level structures coincide with phrases, I can think of the one already seen above, which concerns the approach of metric cycle beginnings: a very likely location of a cycle beginning is right after a small-scale process of both increase of tempo and dynamics has taken the opposite direction. The increase of both performance parameters helps articulate a clear Anacrusis necessary in order to prepare the following cycle beginning, while the local decrease right before this beginning both emphasises this beginning and gives it a more rounded character. In Repp's average graphs these patterns occur exactly at those points where the compositional structure also suggests cycle beginnings—that is the middle of bars 1, 2, 3,4 and the beginning of bar 4. (See the two graphs in Figure 5.23a juxtaposing Repp's two grand average graphs. Figure 5.23b will be explained later.) Exceptions to this "rule" abound and that depends both on the performer and the compositional structure. A characteristic exception is when such cycle beginnings occur at the very end of larger phrases, which tend to be approached through a process of decrease in both performance parameters (that is, through a weak anacrustic process) (see the end of the first phrase of the Chopin Etude in both dynamic and tempo average graphs during the first half of bar 5).

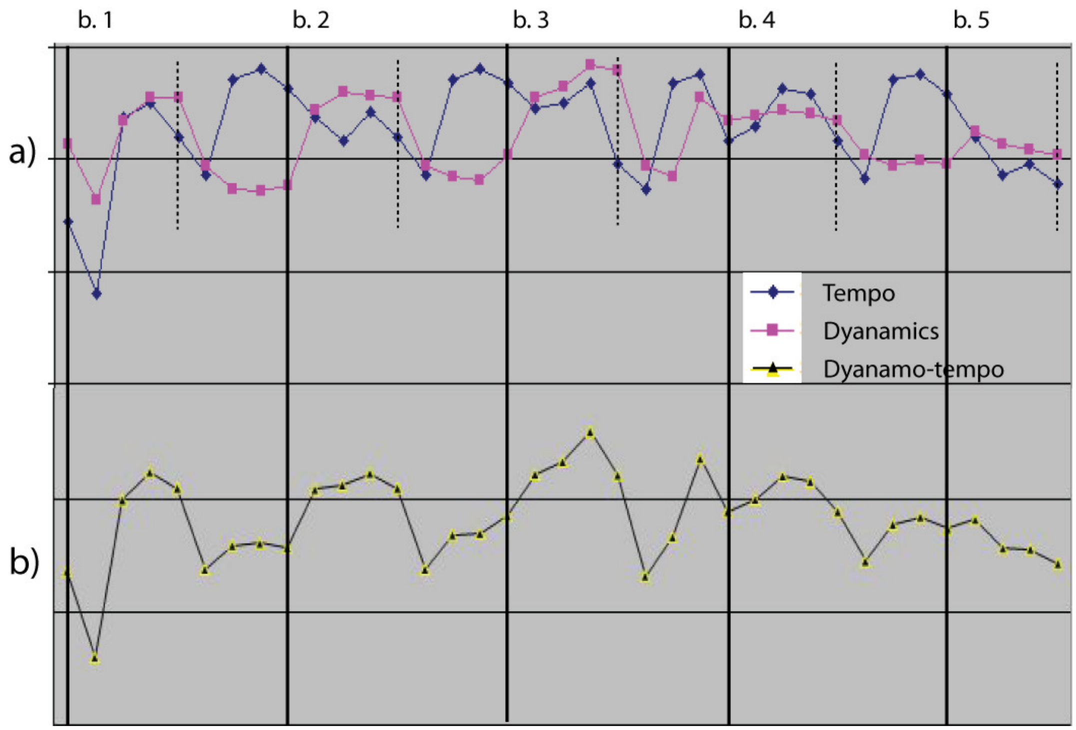

Figure 5.23 (a) Repp's grand average Timing and Dynamic graphs and (b) Dynamo-tempo graph.

If increase in both dynamics and tempo tends to occur during (and helps to articulate) anacrustic processes preparing cycle beginnings, the reverse processes would be expected to occur during metacruses. A look at Repp's average graphs (Figure 5.23a) shows that this is indeed the case in all metacruses after the cycle beginnings at the middle of the first four bars and at the beginning of the first bar. However, as we've just seen, decrease in both these parameters tends to occur not only at the very beginning of metacruses but also at the very end of anacruses. Thus when this decreasing process occurs for more than one beat, a good guess for locating beginning accents is somewhere in the middle. Again here, exceptions abound and they are more than necessary in order to create not only a more expressively interesting performance but also a more clearly communicated structure. In relation to the latter, recall the necessity of differentiating phrase endings by weakening anacruses through a decrease in both tempo and dynamics. In relation to the former, recall the discussion above of cases where metacruses are not shaped the normative way but through the reverse process—that is, by interpolating a metacrustic stretch (made possible by increase in both parameters) before Metacrusis is allowed to release its energy.

In cases where tempo and dynamics either both increase or decrease, things are perhaps more straightforward. When one increases and the other decreases things get a bit more complicated. This is because such processes do not seem to favour certain places more than others, or at least, this is something I cannot easily tell by informal observations of tempo and dynamics graphs. One reason is that such hybrid cases do not have a strong power to either help increase or decrease Musical Momentum since the ascending power of the one is mitigated by the descending power of the other. In order to be able to investigate such more complex patterns, I would need tools that would allow me to make more systematic observations.

5. 3 Dynamo-Tempo graphs

The first idea that comes to my mind when attempting to make sense of the way tempo and dynamics interact to shape expression is to simply add them up. This would seem to be a reasonable thing to do given that both performers as well as listeners shape/control or experience these parameters together as one unified expressive force. With only limited exceptions, where performers might consciously decide to decrease the tempo at the end of phrases or crescendo at other places, tempo and dynamics are shaped not as independent forces in a quantitative manner but more qualitatively as unified gestural force. That is, a performer mainly "thinks" through the body in terms of expressive movement—shaping for example, a particular kind of Anacrusis for a specific section, which automatically translates during performance into some kind of unified dynamic-tempo pattern—without being consciously aware of tempo and dynamic patterns independently. Thus a way has to be found not to stay at the quantitative stage of adding up these graphs but move towards assigning expressive meaning in a way that is truly meaningful both to performers and listeners.

Can I safely add up the values of a tempo and a dynamic graph, however, without losing touch of their expressive meaning in a piece? Can I add up values of two different dimensions—apples and oranges, in other words? And what would their sum mean? The answer lies in the way each parameter contributes towards shaping expressive movement and that is by increasing or decreasing Musical Momentum. This is the common function that they both share and this is what would allow me to add them up. The result for adding up Repp's two average graphs, which I will call **"dynamo-tempo graph"**, is shown in Figure 5.23b.[249] One can clearly see here how, when both parameters increase or decrease, they articulate stronger processes of increase or decrease of momentum respectively, as discussed above. We have to be careful here, however, not to equate this dynamo-tempo graph with Musical Momentum. Musical Momentum, which was first introduced in chapter 3, was defined as the sum of Musical Tension, Rhythmic Drive and Goal Direction and was represented by the arrow notation graphs. Even though dynamo-tempo graphs may in some cases prove to look quite close to these arrow graphs, a lot of important information is missing. Not only is the contribution of the compositional structure not taken into account but also GD is not shown. To make this more clear, consider one more time the end of the first phrase of the Etude in bar 5: decrease of tempo is experienced as a decrease in RD; decrease of dynamics as a decrease in MT; while the specific compositional structure, with the dominant harmony and the anacrustic rhythm in the melodic line, is experienced with a strong goal directed motion towards the tonic chord at the middle of the bar. The result is a weak anacrustic gesture represented by an arrow pointing downwards and not a Metacrusis of Decrease of Momentum. In other words, even though both the dynamo-tempo graph and the Musical Momentum graph go down in approaching the final note of the phrase, the Musical Momentum has forward moving character. [250]

A problem relating to the general issue of how to add up not only tempo and dynamics but all of the structural factors involved in a piece, is how I decide where and at what level the structural cycle beginnings fall. Let's assume my starting point is again a dynamo-tempo graph. Figure 5.24 juxtaposes the dynamo-tempo graphs of Cortot's and Perahia's performances of the first 20 bars of the Chopin Etude. Let's also assume I do not have any information about the metric structure of the piece, or what piece is being performed, and I want to make a prediction about cycle beginnings based on only the performance structure. I've already proposed above an informal rule, which suggests

[249] To add these two graphs up, I first modify the numerical values of one of the graphs so that it falls in about the same range as the other one (as at Figure 5.23a). This usually involves both adding or subtracting some constant number to all values of one of the graphs and changing the range between the lowest and highest values. Then I double the values of the dynamic graph and add them up with those of the tempo graph. The reason I double the values of the dynamic graph will be explained below.
[250] In trying to answer "whether expressive timing is independent of expressive dynamics at the detailed level…or whether these two parameters are linked", Repp concludes, based on advanced statistical analyses, that "these two important dimensions seem to be controlled independently at this local level and thus offer the artist many degrees of freedom in giving a melody expressive shape". What he means is that these parameters do not seem to influence (or at least correlate with) each other the way they do at the higher, phrase level (the faster the louder and the slower the softer). And I agree. However, as I argue here, at this detailed level of structure, but also at the larger level, performers do not control them (that is, think or process them) independently. In fact, they don't generally process them as such (that is, as tempo and dynamic fluctuation) but rather largely as unified gestural process.

probable places for accents. (However, many more will be necessary before I come up with a complete set of rules for this purpose.) According to this rule, accents tend not to lie on the peaks of dynamo-tempo patterns but generally one beat after them. How can I explain, however, cases where such peaks do coincide with strong accents? A reasonable answer would be that a relatively abrupt increase in both tempo and dynamics would create a cycle beginning at some low level of structure. Both graphs in Figure 5.24 have a number of abrupt increases, but how much increase is enough to make a point in time be experienced as a cycle beginning? Even when I know the compositional structure of the piece, notated metrical downbeats are not always the ones that will end up being experienced as cycle beginnings. This Chopin Etude is a good example of this, where at the bar level, at least for the first phrase, cycle beginnings occur at the middle of the notated bars. Then, there will always be cases when cycle beginnings will occur at places not suggested by the compositional structure. This is the case with Cortot's performance of this piece, which, as already discussed earlier in this chapter, shapes strong displaced accents after the beginnings of the first three bars (but also in other places later in the piece). This observation was made above by ear and when I look at the dynamo-tempo graph for verification it makes sense since at those points I can see dynamo-tempo peaks of rather pronounced degree. But then at other places, where similar peaks occur, my ears cannot detect any significant accentuations.

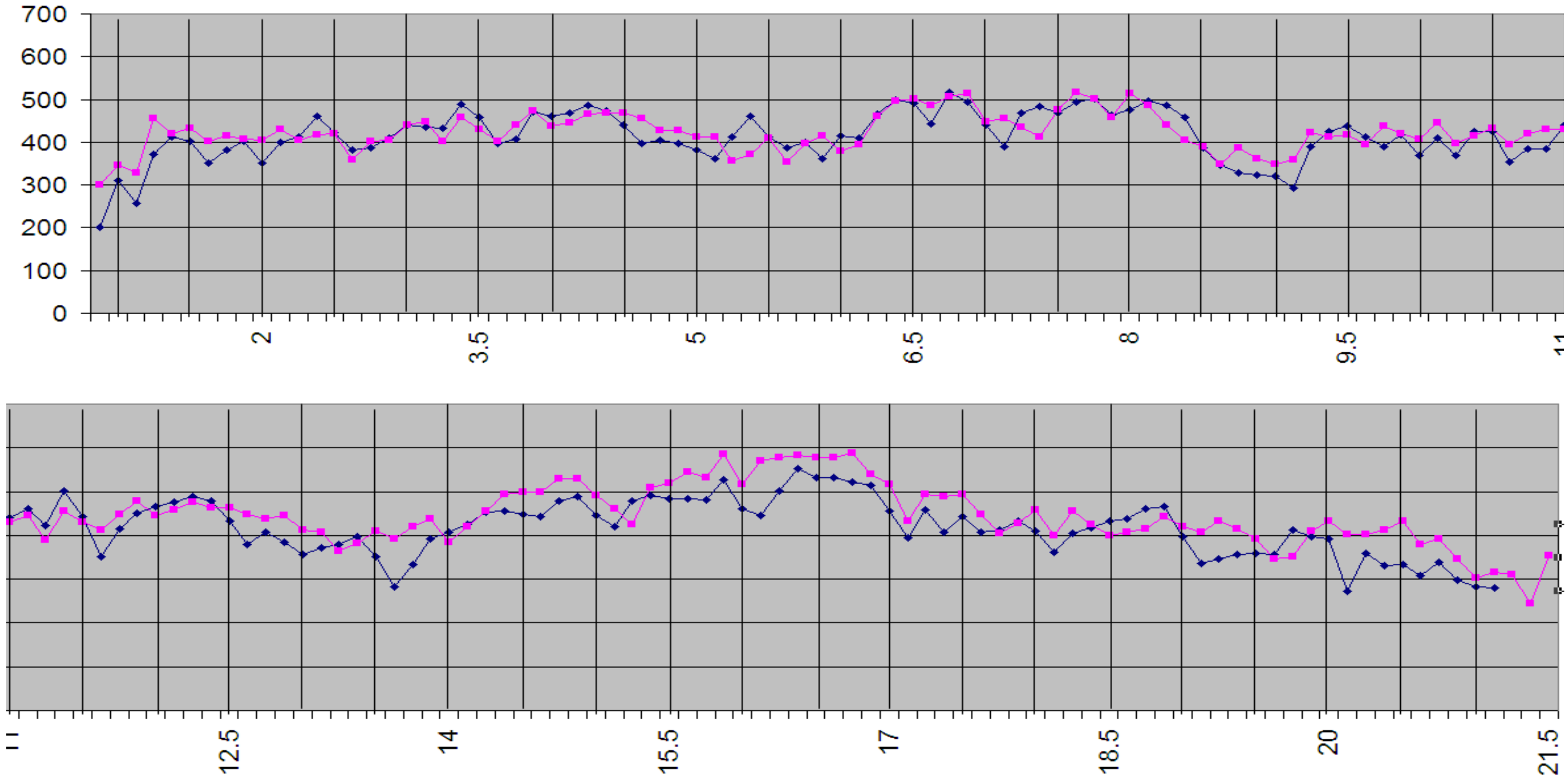

Figure 5.24 Dynamo-tempo graphs of Cortot's (pink/light) and Perahia's (blue/dark) performance of Chopin's Etude in E, bars 1-21.

And then there is the problem of structural levels. Even when I have all structural factors known to me and also use my ear, there will be cases when I cannot easily decide how much accentuation (if that were the only factor involved) will be enough to render a point in time as structurally more important than some other nearby event. In Cortot's performance, for example, the accentuation on the second quaver of bar 1 is so strong that seems to overpower even the middle of the bar, which would have otherwise been interpreted as cycle beginning. In Cortot's graph of Figure 5.24, the dynamo-tempo peak on the second quaver beat of bar 1 is stronger than that of the third quaver beat, which suggests that, at the bar level, I could interpret the second, third and fourth beats of this bar as a single long Metacrusis, with the third beat shown as a lower-level articulation (see the motion graph in Figure 5.6). Or on the basis of my ears and analytical judgments as well as consideration of the compositional structure, I might interpret the third beat as a cycle beginning of equal structural importance as the previous beat (see the bracketed motion graph shown in Figure 5.6). In the first case, the more normative metric structure with downbeats at the middle of the notated bars is shifted one quaver beat earlier; in the second, structural ambiguity prevents me from hearing any clear metrical grouping at the bar level, but instead limits my rhythmic/gestural experience on the crotchet beat level.

Finally, I can now see an important limitation to the graphic system I've been using to describe expressive gestures. Even though arrow gestures convey a lot of interesting information in a quite economical and visually suggestive way, they leave out information that, to many, might be very important. In my attempt to capture the way tempo and dynamics function as one unified gestural entity, I came up with a sum value that denies in some ways the individuality of each particular combination of tempo and dynamic patterns. An expressive gesture represented by a forward pointing arrow of 30 degrees upwards, for example, might be the result of an increase in both tempo and dynamics, a decrease in tempo and increase in dynamics, a decrease in dynamics and increase in tempo, or even more exceptionally a decrease in both. In each case, different degrees of change of each parameter combine with the compositional structure to shape a unique expressive character. Is there a way to capture this more particular and unique combination? I will attempt to answer this below.

5. 4 Dynamo-Tempo patterns

In trying to come up with solutions to all of the above problems, one thing seems to be obvious: that a more systematic and at the same time more quantitative system is required. This is not to say that the arrow gestural method will be rejected; on the contrary, the point of a more rigorously quantitative system is to support it and make it more practically useful—a system that makes possible a closer mapping of structure (and here, specifically performance structure) onto expressive meaning.

I will start from the last problem discussed above: how, on the one hand, to consider tempo and dynamics together as one entity and, on the other, to maintain the unique expressive contribution of each parameter. As a solution, I will experiment with a new theoretical concept, that of the "**dynamo-tempo (DT) pattern**". Figure 5.25a shows the four basic DT patterns. Each of these patterns describes the way a given duration in time is performed by specifying whether dynamics and tempo is increasing or decreasing. It does this by using the + and – signs, the first sign in each pair always referring to dynamics and the second to tempo. While these patterns only specify general direction of parametric value change and not specific amounts, they very effectively capture four combinations of these patterns that have a unique expressive effect.

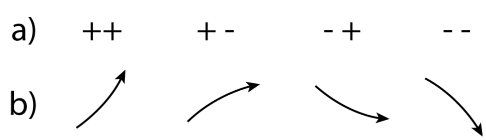

Figure 5.25 a) Four basic DT patterns and b) their corresponding contribution of arrow gestural patterns for Anacrusis.

To demonstrate this I will introduce a new piece of music, Scriabin's Etude for piano Op.2, No.1, as performed by Vladimir Horowitz in 1962. The score of the piece is shown in Figure 5.26 and the tempo and dynamic fluctuation graphs of selected excerpts in Figure 5.27a. The way the first four accents of this piece are approached locally provides a good example of the different character of these four DT patterns. Even though, in terms of compositional structure, the context is different in each time, the comparison can still be made by focusing on the dynamic movement of the approach. To make the reading of DT patterns easier, the corresponding patterns below each quaver beat have been written below the graphs (Figure 5.27b). Listen to how the accent on the downbeat of bar 2 is approached by a -- pattern, one that undercuts to the greatest degree the forward moving character of Anacrusis (Figure 5.27c) and one that conveys an element of submission. By contrast, the third quaver beat of the second bar, an otherwise metrically weak beat, is elevated to a rather strong (although lower-level) motion cycle beginning through a ++ pattern approach. Even though, rhythmically, the melodic figure of the second bar does help to emphasise this third beat, its placement as part of an appoggiatura at the beginning of the bar minimises this accentuation and subsumes it into an overarching metacrustic gesture. Horowitz chose to go against the compositional structure here and through this ++ pattern he managed to project a sense of determination.[251] While the +/- signs convey the specific character of these movements, the corresponding motion graph, shown in Figure 5.27c, conveys, in addition to the type of gesture, the strength of these patterns: in the first case, a weak Anacrusis is graphically represented by an arrow that points downwards and a -- DT pattern, and in the second, by an arrow that points upwards and a ++ pattern. The information provided by the two symbol systems is complementary: an Anacrusis, for example, of a specific strength will have a different effect if shaped by different DT patterns, while conversely the same DT pattern will have a different effect if it occurs in the context of a different gestural type.

[251] A more detailed analysis of the expressive meaning of this piece in terms of linguistic metaphors, as the terms "pushing", "hesitation" etc. in the graph here suggest, will be undertaken in the following section (5.3).

Etude Op.2 No1

Scriabin

Figure 5.26 Alexander Scriabin's Etude for piano Op.2, No.1.

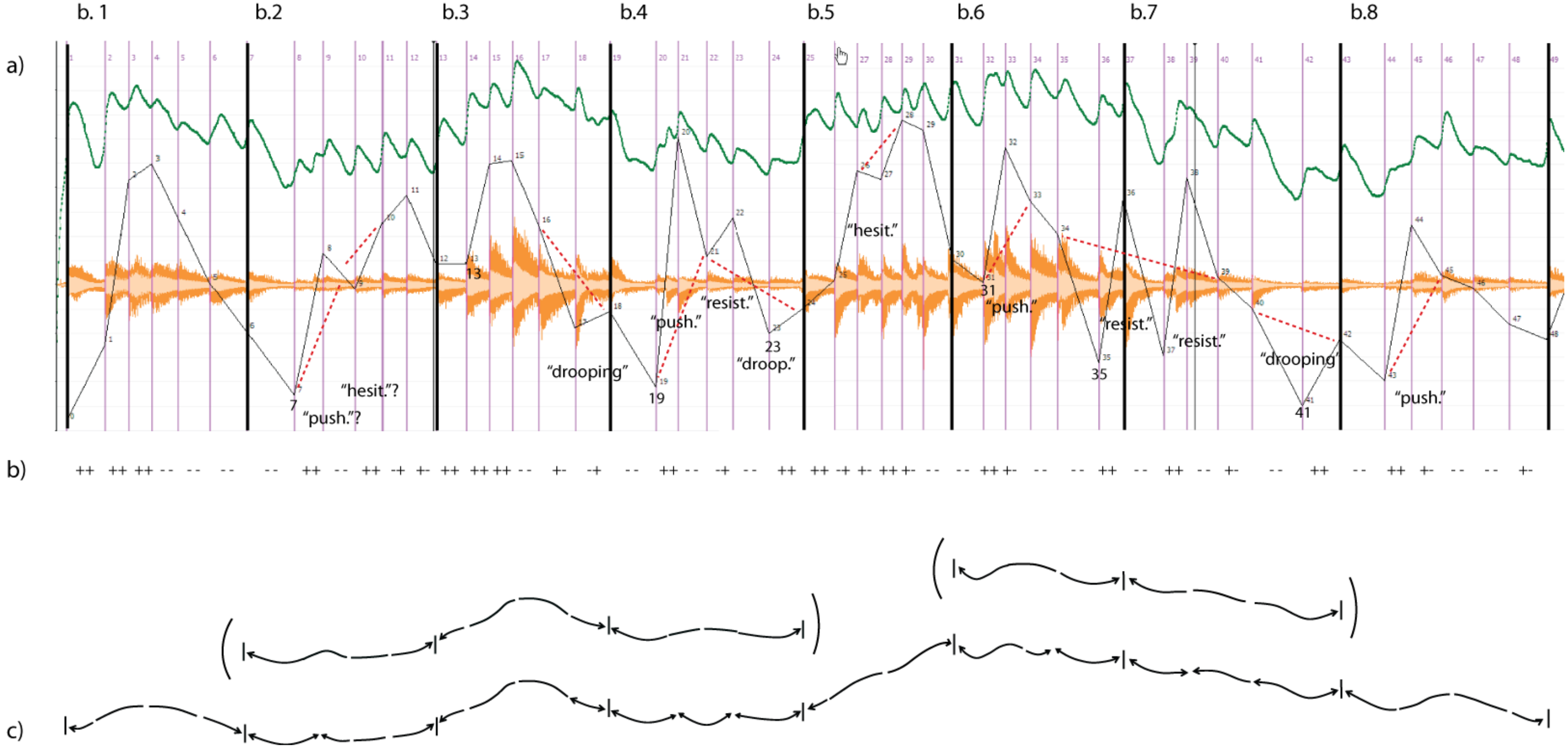

Figure 5.27 a) Tempo and dynamic fluctuation graphs of excerpts from Horowitz's performance of Scriabin's Etude for piano Op.2, No.1; b) Dynamo-tempo patterns; c) motion graph . (*Media Example 5.17a* SV video capture of Figure 5.27a, bars 1-16; *Media Example 5.17b* SV video capture of Figure 5.27a, bars 26-33.)

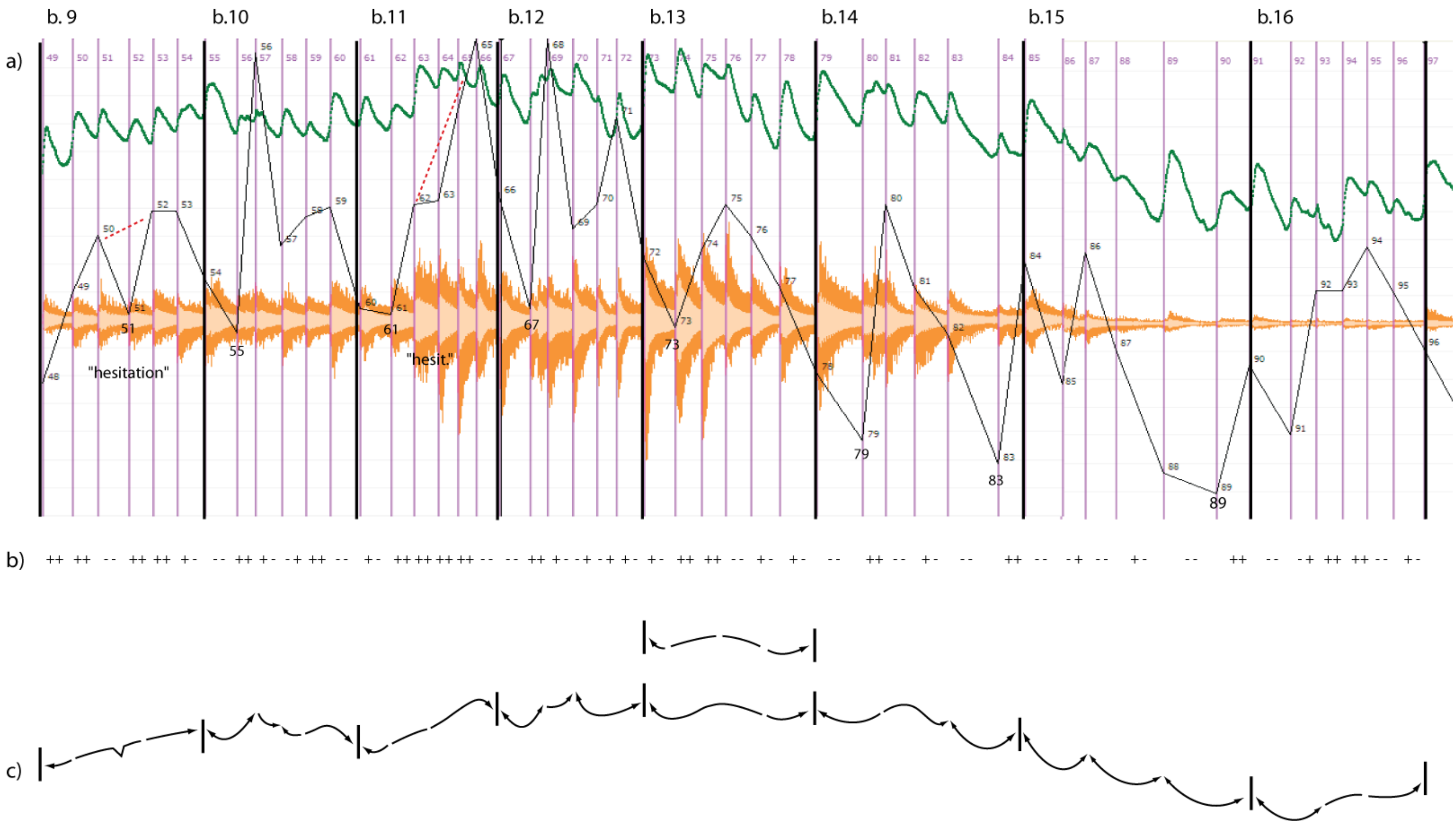

Figure 5.27 (contin.)

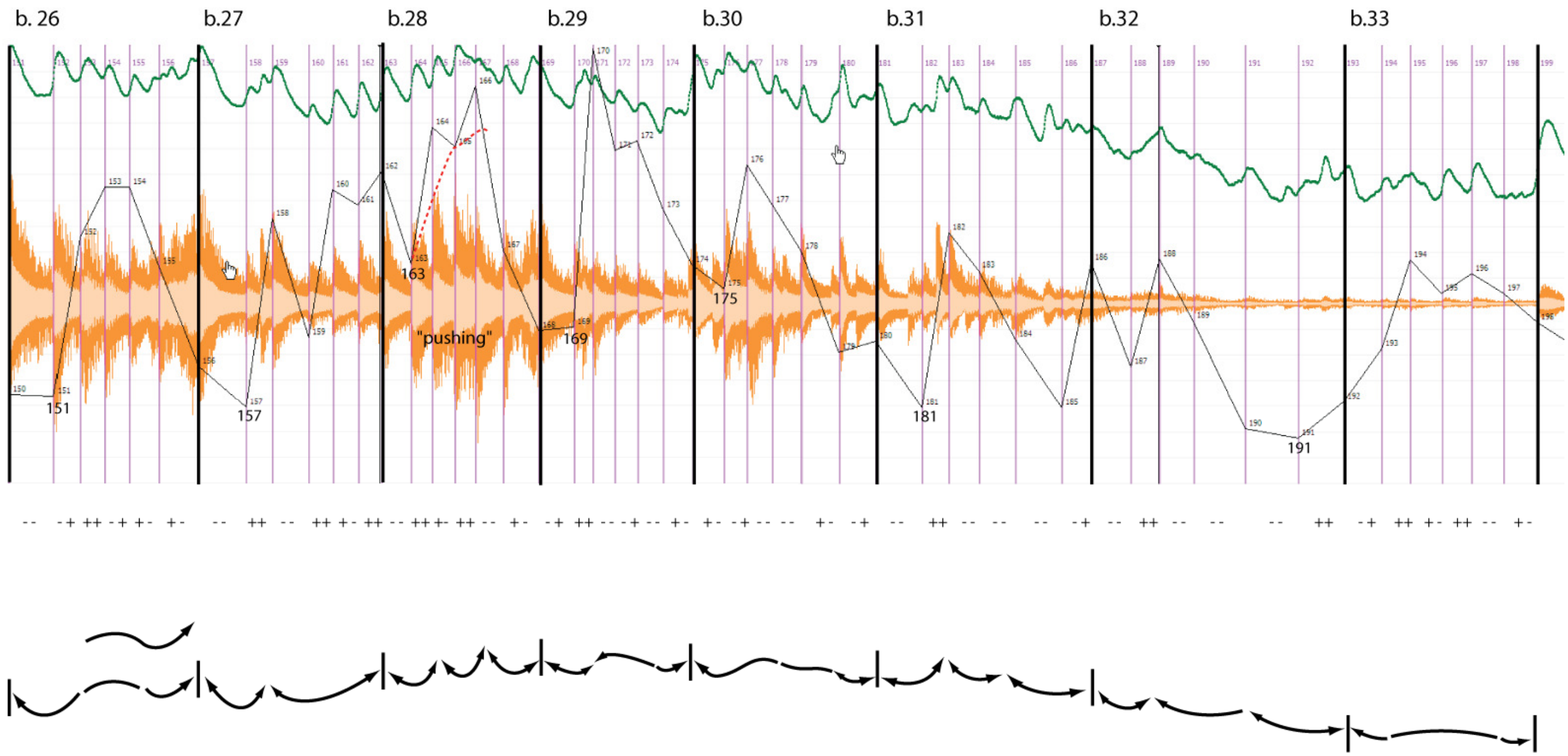

Figure 5.27 (contin.)

The local approach of the downbeat accent in bar three presents an example of how DT type and overall gestural strength interact. By using our ears we can see that the +- pattern at that point makes possible an accent even stronger than the one before, approached by a ++ pattern. This is, however, not because of the kind of pattern itself, but because of the specific values of this pattern, and also the compositional structure. If we were to compare the ++ and +- patterns on equal grounds, the first would make possible a stronger Anacrusis and articulated accent. But here, the significantly greater increase in dynamics of the +- pattern outweighs the relatively small increase in both tempo and dynamics of the ++ pattern. Even though the decrease of tempo in the +- pattern does decrease the overall strength of the pattern, it doesn't do so to a significant degree. It does, however, change significantly its general character. While a strong ++ pattern tends to bring an element of surprise with the increase in both parameters, the decrease in tempo of the +- pattern gives time for the listener to prepare for the new cycle beginning, which in this case is articulated with an increase in dynamic value.

Even though the +- pattern can generally be described as "strong arrival with preparation" (in contrast to "strong arrival with surprise" for the ++ pattern), in specific contexts it can have a different effect. At the approach to the downbeat of bar 4, for example, we are surprised by an accented high melodic F, achieved through a +- pattern on the last quaver beat of bar 3. This surprise is made possible both by the melodic leap in the soprano and left hand and by the fact that at this point we don't expect such a pronounced delay, which is made even more striking by the dynamic stress. In the arrow graph of Figure 5.27c, this syncopated accent has been shown by the addition of a lower-level Metacrusis at this moment. Thus, +- patterns (like ++) have the power to articulate accents even when the other factors involved might not suggest this. By contrast, -- and -+ patterns tend to have the opposite effect. Instead of increasing Musical Momentum towards some accent, they generally decrease momentum away from it. Therefore, when they are found at places where accents are approached, they have the effect of undercutting the forward drive into the accent and minimising its accentuation.

That was the case of the -- pattern we saw at the end of bar 1, but also of the -+ pattern that occurs at the very end of bar 3, as the following downbeat is approached. As in all DT patterns, the parameter that seems to have the most crucial role in determining the general character (strength) of Musical Momentum is dynamics. By this I mean that if I compare -+ and +- patterns, what dominates in each case seems to be dynamics: in the first case, dynamic decrease will dominate by shaping an overall decrease of Musical Momentum and, in the second, dynamic increase will give the opposite effect. The placement of -+ patterns right before expected downbeats, as at the end of bar 3, is particularly interesting and uncommon. On the one hand, the tempo increase gives a surprise element, since in approaching downbeats we normally expect a local tempo decrease and not increase; on the other hand, it has the effect of "drawing back", since the dynamic decrease in this context appears as an attempt to resist the forward momentum of the tempo increase. Moreover, when this pattern is placed right before a new downbeat, an accentuation is encouraged on the penultimate beat, as here through the +- pattern just discussed. This is because, in such cases, this -+ pattern is experienced by the performer as a kind of "displaced" or syncopated lower-level metacrustic gesture of a sigh-like character. The accentuation at the beginning of this gesture tends to compete with the expected one on the following downbeat, creating a metrically ambiguous situation. In the motion graph of Figure 5.27c, notice how the arrow of the last gesture of bar 3 is both backward and forward pointing, showing this ambiguous character.

To go back to Figure 5.25 and summarise, each of the four basic DT patterns has a unique expressive character shaped by its unique combination of increase or decrease of tempo and dynamics. At the same time, this character could also be classified by the strength of its overall contribution to Musical Momentum. The order by which the DT patterns have been arranged here represents how I perceive this aspect of their character. The arrow gestures below these patterns (see Figure 5.25b) show how the strength of an anacrustic gesture can change in relation to different DT patterns. Since, as I said above, I consider dynamics as more decisive in shaping the overall character of a DT pattern, we can adopt a simple rule of thumb that dynamic values count for twice as much as tempo values. So, when I have, let's say, a +- pattern with equal amount of change in dynamics and tempo (for example +20 -20), in adding them up the formula would be 20x2 – 20=20, resulting in a positive dynamo-tempo change. The same values for a -+ pattern would result in a negative dynamo-tempo change (-20x2 + 20=-20). In this way, a gesture shaped by a +- pattern will in most times have an angle of more than 30 degrees and one shaped by a -+ an angle less than 30 degrees (in relation to the horizontal axis).

Things are, however, more complex than that, and there will be times when after adding up the values of say a -+ pattern, it might have a greater overall strength than a +- pattern, which is higher on the general strength scale. This makes perfect sense if we consider that what determines strength is not just whether a pattern increases or decreases, but how much it does so. In addition, absolute values of the beginning and end of a pattern are very important. If, for example, we compare a passage increasing from 30 to 60 dB with one increasing from 100 to 110 dB, the increase in overall strength of the latter will most likely feel greater due it its higher absolute values, even though the proportional increase in the former is much greater. To conceptualise better the parameters involved in determining the overall strength of experienced DT patterns, Figure 5.28 below offers an elaborated version of Figure 5.25. The **"Performance Cube Matrix I"** describes a range of different strengths of a single DT pattern, here the ++ one. In moving from left to right, the degree of change of dynamics decreases (and thus of strength too) decreases, while from top to bottom, the degree of change of tempo decreases. Concerning the overall strength of each DT pattern, this decreases as we move from the top left corner to the bottom right. I also show the dimension of overall Momentum strength—the sum of the average of the beginning and ending values of tempo and dynamics of each gesture—moving from the front to the back. To make things more clear, each square of the cube matrix can be thought of as representing a short segment on the dynamo-tempo graph, whose strength is determined both by the angle (i.e. the degree of change) of the line (corresponding to one of the 16 basic squares of the matrix) and the height of its location on a vertical scale (corresponding to one the four slices of the matrix as it moves to the back).[252] The matrix of Figure 5.28 represents only the ++ pattern. Each of the remaining DT patterns can similarly be represented its own cube matrix: if placed in order, as in Figure 5.25 above, they overlap with each other so that a very weak ++ pattern, for example, might have an overall strength lower than a very strong +- pattern, for example.

[252] These slices, of course, can be broken down into thinner layers.

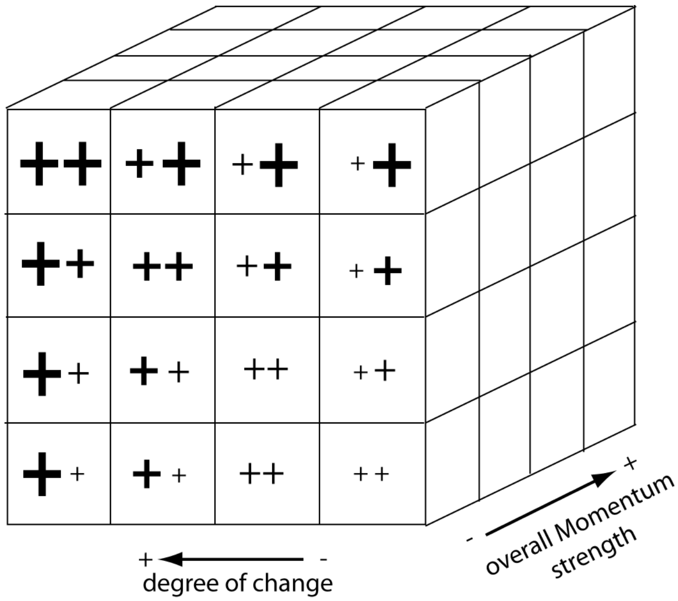

Figure 5.28 "Performance Cube Matrix I" representing the strength of dynamo-tempo patterns.

For the purpose of the kind of analysis we are concerned with here, this matrix functions only as a conceptual aid rather than as a practical tool. Sometimes one simply wants to construct a motion graph by ear. Or numerical strength can take care of itself when one adds up the values of the tempo and dynamic graphs. For the most part, the method I've been using here involves the ear in conjunction with different kinds of empirical data and analytical results. The use of the ear is necessary in order to encourage the involvement of the whole body (given that this is our ultimate pedagogical goal). Conceptual thinking is, however, equally important so as to guide the highly subjective nature of intuitive/bodily thinking and provide other insights unreachable by other means. The motion graph of Figure 27c is the final product after engaging all the aforementioned analytical methodologies.

I will now move on to a detailed study of how DT patterns interact with compositional structure in Horowitz's performance of the Scriabin Etude and so shape expressive movement. Above, I discussed the general character of DT patterns more or less in isolation. The focus now will be on larger expressive gestures. One of the most interesting and important ideas in this piece is the opening two-bar motivic idea, which repeats several times throughout the piece. The compositional structure of this idea is such as to encourage an anacrustic motion into its second bar, followed by a Metacrusis: an ascending melodic line of constant quavers drive into the focal point of the motivic idea right on the downbeat of the second bar, where a durationally longer B appoggiatura resolves down by step. To a large extent, the meaning of this piece depends on the narrative of the transformation of these motivic ideas as the piece unfolds. This narrative has been partly determined by the composer but it's up to the performer to shape its final state.

Right from the very beginning, we hear a rather confident ++ process fully supporting the forward-moving expressive potential of the passage. This initial increase of Musical Momentum forces the opening Metacrusis (always present at the beginning of every motion cycle) to almost disappear. Recall that a ++ Metacrusis means the weakest possible type, which in this case merges quickly with the IN process in the following few quaver beats (see the motion graph of Figure 5.27c.) As we enter the second half of the bar, however, this increase of momentum process is reversed at a point where our expectation of the new arrival is becoming stronger. The -- process, lasting for three whole quaver beats, first initiates a decrease of momentum process, gradually giving way to a dramatically weakened Anacrusis. The Anacrusis here is so weak that the following downbeat can hardly be experienced as a new arrival but perhaps more as part of an overarching DE process that began in the middle of the previous bar. What helps articulate a beginning at that point is the compositional structure, with its very clear harmonic change as well as the melodic appoggiatura.

When the same motive repeats sequentially a fourth higher in bar 3, we hear a stronger increase of momentum process (mainly due to the higher dynamic level) and an even weaker initial Metacrusis. Like bar 1, the reversal takes place after three beats of a ++ pattern, except that, now, the Anacrusis shows obvious signs of strengthening—although as before, it emerges not directly through the IN process but after a DE process has undercut this forward momentum. As discussed above, we first have a rather strong +-, which is however succeeded by a weaker -+ as we approach the new beginning. The character of this Anacrusis is thus defined by both these DT patterns, each shaping a different part of the anacrustic process: the first describing its main or beginning part, and the second describing the way the following beginning accent is approached. In the third repetition of the same motive in bar 5, there is no longer any reversal after the initial IN process but, instead, the Anacrusis drives the momentum that has built up from the very beginning of the bar very strongly into the following downbeat. This time the Anacrusis starts earlier and lasts longer than the previous times. Its main part is defined by a strong ++ pattern after which we see a gradual weakening that does not, however, affect its overall strength. First there is a change from this ++ to a slightly weaker +-, and just before the new beginning a weak -- rounds up the following accent. We've already seen this local weakening of the anacrustic process right before a new accent many times, and it occurs as expected many times in this piece too.

Before I go on and look at some other interesting details and analytical problems in this piece, I'll stop for a moment and summarise the observations made so far. Considering the fact that each gesture is defined by two phases, the possible combinations of DT patterns that can describe a given gesture multiply. The "**Performance Cube Matrix II"** (Figure 5.29) organises these possible patterns along three expressive dimensions. Each slice of the matrix, as we move from the front to the back, represents one of the four gestural processes—AN, IN, DE, ME. Each of these slices contains 16 pairs of DT patterns, arranged in order from the one inducing the most to the one inducing the least Musical Momentum. In the Anacrusis layer shown at the front of Figure 5.29, the first DT pattern in each pair describes the main, or global, part of the gestural process (which might last for more than one beat), while the second one describes the way the following accent is approached locally (normally the very last beat). Thus, as we move from left to right on the matrix of the anacrustic layer and from top to bottom, we have a decrease in the strength of its main and local part respectively. In the case of the metacrustic layer, we have the reverse situation. The strongest metacrustic process is the one shaped not by a ++ but by a -- pattern, and the weakest by a ++ pattern. Moreover, the first pattern is the one that refers to the way the accent is locally approached or, rather, left, and the second the one that refers to its main process. Even though IN and DE do not approach or leave beginning accents, they can still be described by two (or even one) DT patterns, each focusing on a different phase in its course.

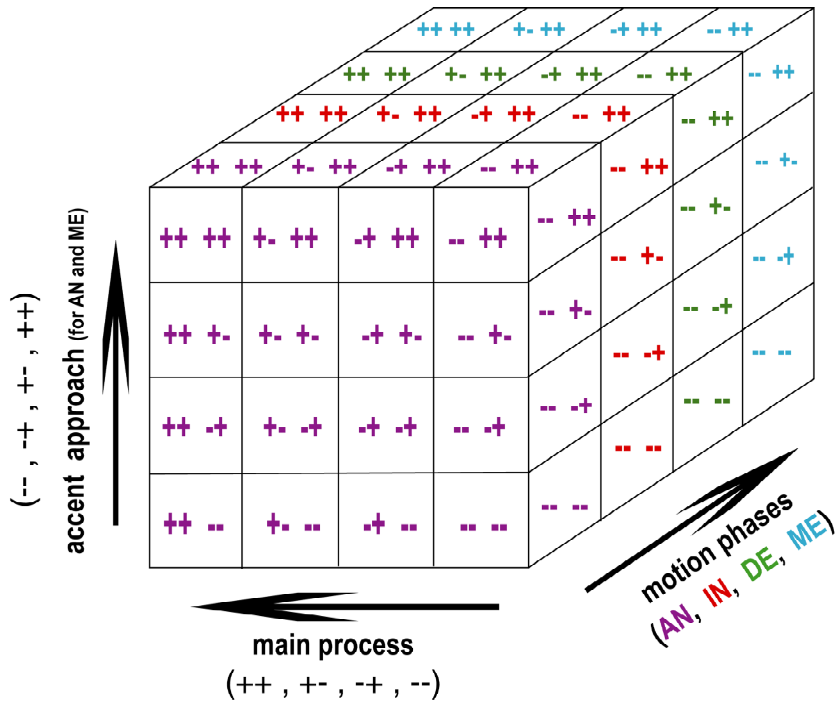

Figure 5.29 "Performance Cube Matrix II" representing the character of expressive gestures.

When this matrix is considered together with the previous one (Figure 5.28), the character and strength of each expressive gesture can be described both quantitatively and qualitatively. Based only on the general DT pattern type, the corresponding arrow gesture takes a different shape, as shown in Figure 5.30: the angle of the main part of the gestural arrow is determined by the first DT pair and the angle of its tip by the second DT pair. When considering the Performance Cube matrix I, these arrow gestures are shaped according to both their overall global Momentum strength (that is, how high on the vertical Musical Momentum axis) and their inner or local strength (the local increase or decrease of Momentum). In analysing musical performances, the mechanical application of these two matrices is not enough to describe their expressive meaning. It's not, in other words, about simply cutting musical motion into phases and attaching them DT patterns. It takes significant critical thinking, always in consultation with the ear, to determine the precise expressive function of DT patterns.

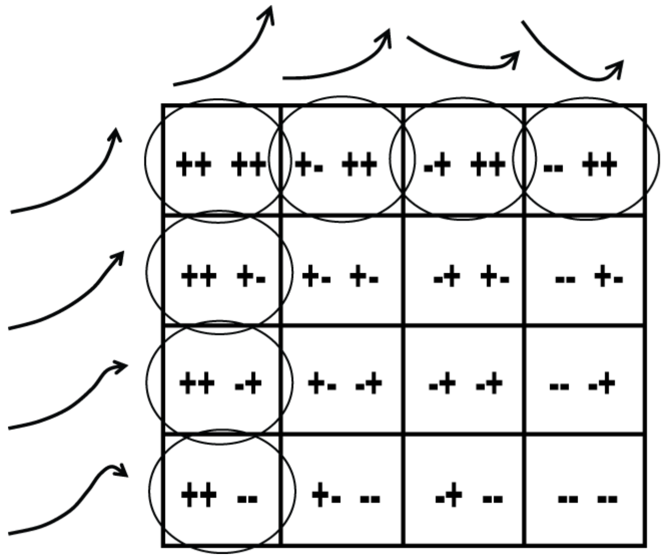

Figure 5.30 Mapping of DT patterns onto arrow gestures of the anacrustic layer of the "Performance Cube Matrix II".

5.5 Special surface-level expressive effects

I will now consider some more complex issues associated with these DT patterns. What's always very important is to differentiate between minor local expressive details and more larger-level processes. Consider bar 9 of the Scriabin Etude, at which point, after the end of the first 8-bar phrase, the beginning melodic idea returns. If we examine the sequence of DT patterns in this bar, we can see an obvious pattern, which, as in the previous repetitions of this motivic idea, supports its forward drive: with the exception of one -- pattern on the third beat, the remaining ones shape a strong IN-AN process through four ++ and a final +- pattern. In this context, the -- pattern can only have a subsidiary role, creating a momentary interruption of this forward-moving process—one that sounds like a local "hesitation". This local break of the surface of an otherwise smooth and consistent ascending process can also be visualised in the tempo graph, where BP 51 looks like a misplaced or lowered point of a continuous line from BP 50 and 52. The (red) dotted line connecting BPs 50 with 52 in the tempo graph of Figure 5.27a shows how BP 51 is considered as a deviation from a more normative tempo pattern. In the motion graph of Figure 5.27c, the interruptive function of this -- pattern could be represented accordingly with a little break in the ascending line of the

IN process (however, I generally don't integrate such special symbols within the gestural arrow graphic representation).

"Hesitations" of this sort are not infrequent in musical performance and can range from very minor, perhaps unintentional breaks in the tempo and/or dynamic flow to more substantial and intentional ones, such the one just discussed. An interruption of a very minor character occurs when the same motive repeats again in bar 11. Here, as can be easily visualised in the tempo graph, it is only caused by a minor tempo change in the degree of acceleration, and not by a deceleration as on the previous occasion. Yet it's enough to be heard as a minor "hesitation." A similar case occurs in bar 5, this time in a way that makes this break less perceptible. Here, even though the tempo break is significant, the way dynamics and tempo work together makes this movement much smoother. Between two ++ patterns that support the IN process on the way to the Anacrusis, we first have a -+ and then a +- pattern, both of which weaken this process in two phases: first by dynamic decrease, and then by a tempo decrease. The effect of the dynamic decrease at beat 2 is minimised, however, by the tempo increase, and the tempo decrease on the following beat by the dynamic increase.

The final repetition of the initial motive in the A section, at bar 13, causes new analytical problems. Here, too, most of the DT patterns are of the strongest type (two ++ and three +- patterns), with only one weak -- pattern undercutting the forward movement. Their specific arrangement, however, elevates the -- pattern to a more decisive functional role in the shaping of the overall gestural function. The -- pattern here is not followed by a tempo increase, as in bar 9, but by a steady process of pronounced deceleration that weakens the emerging Anacrusis. This allows the -- pattern to function as part of a decrease of momentum, as shown in the motion graph of Figure 5.27a. This in turn influences (retrospectively) the function of the previous two ++ patterns: their function as increase of momentum does not lead directly to the final Anacrusis, as was the case with the previous repetitions of this motive, something that minimises their overall perceived strength. Thus, given the initial Metacrusis with its marked tempo drop, it is these two ++ patterns that seem to be the exception. Considering also that the overall tempo pattern of the bar has a general downward direction (compare BPs 72 and 78 of bar 13 with BPs 48 and 54 of bar 9), the interpretation given is one of an overarching Metacrusis lasting for most of the bar, with the two interpolated ++ patterns functioning as a local metacrustic stretch (see the motion graph of Figure 5.27c).

After a middle section that begins pianissimo and gradually crescendoes to prepare a new arrival, the A section returns in bar 26 at a very high dynamic level. The return of the initial motivic idea appears more confident now, in contrast to its very first appearance, whose forward momentum was weakened. Bar 26 compares with bar 13 just discussed: they both have an IN-DE inner phase and a high overall dynamic level ending with a relatively strong +- process. The stronger IN and weaker DE processes of bar 26, however, shift the balance of the overall process to the right, favouring anacrustic motion for most of the bar (see the alternative reading above the motion graph of Figure 5.27c). While in bar 13 it was the two ++ patterns that were subsumed within an overarching ME process, here it is the not so weak -+ (compared to the previous --) pattern that is subsumed within an overall Anacrusis. The one extra beat of deceleration during the second half of bar 13 is enough to make a difference as compared to bar 26, where the deceleration is delayed until the last two beats.[253]

The following motivic repetition in bar 28 is of particular interest, both for the degree of strength and for the particular way it builds up forward momentum. What's different from previous occurrences of the same idea is the articulation of accents as Musical Momentum increases. This strengthens, on the one hand, this increase of momentum phase, and on the other, robs some of the forward momentum of the final Anacrusis. This is due to the increased strength accumulated by these inner-bar accents, which compete metrically with the following downbeat. Notice how the motion graph represents this by showing strong lower-level cycle beginnings on quaver beats 2 and 4 of this bar. Again, as on previous occasions, the overall tempo pattern is clearly that of the typical "S" pattern. What makes the difference is the extra amount of acceleration during beats two and four, which is responsible for the emergence of these lower-level anacruses.

What's important to note with regard to this interpretation is both how it reveals the overarching process, by removing surface level expressive details, and how it explains these surface details in relation to this overarching process. The first is easier to see. The

[253] For beat three of bar 26 in Figure 5.27b, I chose to show the dynamic change of the melodic line (a dynamic increase), as opposed to that of the total sounding structure (a decrease as shown by the dynamic graph), since it carries the most expressive force at that moment. I do the same in other cases, where the way I experience dynamic change in the sounding structure contradicts that of the dynamic graph, which, as I explained at the beginning of this chapter, can only describe the dynamic change in the total sounding structure.

overarching process in bars 9, 11 and 28 is one of increase of momentum, shaped for the most part by a ++ tempo-dynamic process. The way the surface-level "deviations" function in relation to this process differs in each case. In the first two, we have a loss of energy as we build up this process, while in the last, we have extra amount of energy (this loss or extra amount of energy is represented by the blue/shaded area in the tempo pattern of Figure 5.31.) In the first two cases, I described the effect of this loss of energy as "**hesitation**", whereas in the last, the extra amount of energy could be described as "**pushing**". Even though it might appear that the +- DT pattern[254] in between the two ++ patterns causes some loss of energy, careful listening to the music tells me that the tempo drop during beat 3 functions instead as a compensation for the extra amount of acceleration during the previous beat. Figure 5.31 below shows the tempo patterns which give rise to these two expressive performance effects (b and c) along with a few others, all of which make use of the same theoretical framework. In contrast to cases b and c, which describe effects within an overall increase of momentum process, a and d describe the reverse process. These will be described below in relation to various repetitions of the second half of the opening motivic idea, which is dominated by an overarching Metacrusis. Cases e and f will be described below as more extreme cases of the other effects.

One of the factors that play a role in determining the function of such surface expressive details is expectation. Certain motion or tempo/dynamic patterns are expected because of the particular compositional structure, or because of the particular patterns in process, or simply because they are more common in general or more normative for the specific musical genre and style. For this specific piece, as in the Chopin Etude we saw above, the normative tempo pattern seems to be the "S" pattern. Considering also the specific compositional structure, for each repetition of the main motivic idea we expect an IN-AN phase for the first bar (with only a very short initial ME), and for the second a long ME followed by an AN that can range from very short to significantly longer. The specific proportions of this "S" tempo pattern during the second half of the motive play a crucial role in determining both the character of the ME and the length/strength of the AN.

[254] Again here, the DT pattern is shown as ++ and not as -+, for the same reason explained in the previous footnote.

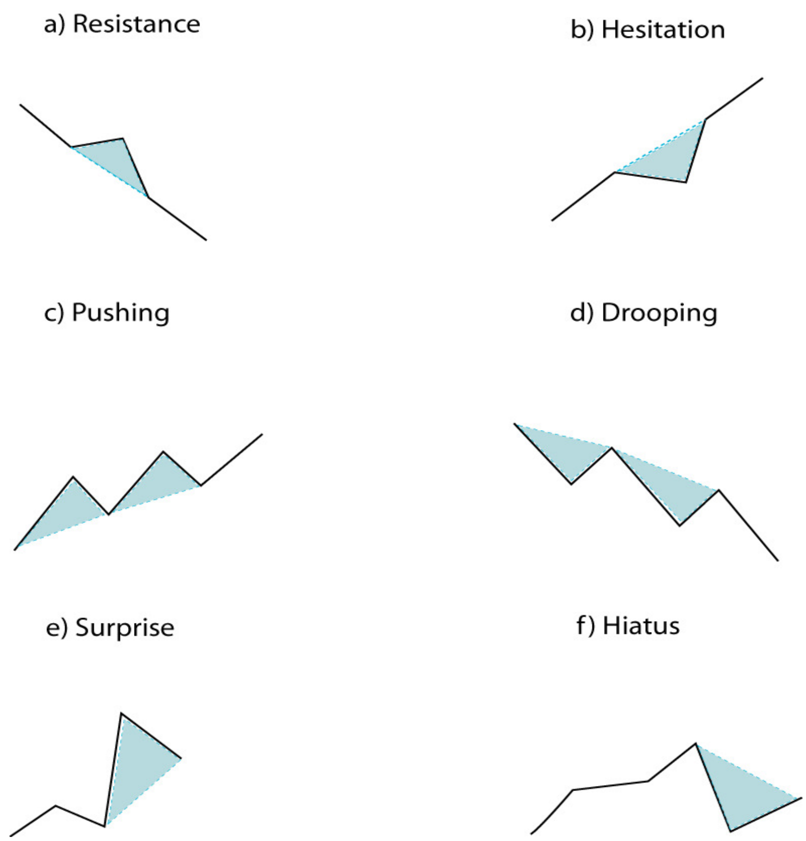

Figure 5.31 Six special expressive effects as a result of surface-level tempo fluctuation.

With this in mind, let's look at bar 2 of the piece. Even though, at the surface level, the tempo graph looks like two overlapping "S" patterns, their overall experienced function is as a single "S" pattern, with some kind of interruption in the middle. The question now is whether the expected or normative pattern is one that would connect tempo graph BPs 7 with 9 or 8 with 10. Is the effect, in other words, that of "pushing" or of "hesitation"? Are we talking about giving more than expected (BP-triangle 7-8-9) or less (BP-triangle 8-9-10)? Even though in this case it's not so clear which one dominates over the other, the tendency in this performance seems to be the former. This is something we have seen before, but here we look at it from a different angle. In bar 6, this tendency becomes more obvious: it's one of emphasising the moment where the appoggiatura resolves on the third quaver beat, by articulating a lower-level beginning accent (in the motion graph I've only shown increase of momentum as a result of this lower-level beginning accent). This creates what I described before as "metacrustic stretch", a local "pushing" within an overarching Metacrusis, postponing for a moment the decrease of Musical Momentum. Given the very decisive appoggiatura in the compositional structure, the effect in this context could perhaps be better described as one of "**resistance**". This expressive effect is shown at Figure 31a and can be thought of as the opposite of "hesitation": resisting a descent (of momentum) as against drawing back (or hesitating) during an ascent. In either case, a surface-level interruption of the opposite directional force goes against the prevailing process. "Pushing" and "resistance" are therefore related processes, and what distinguishes them is the direction of the underlining process, whether it's one of increase or decrease of Musical Momentum. In either case, the performer gives more than expected; in the first case, in order to make an increase of momentum more intense, and in the second case in order to delay or resist a decrease of momentum. An even clearer case of resistance occurs at BP 22 on the fifth quaver beat of bar 4 (extra energy triangle 21-22-23), this time within the later part of the metacrustic descent, after the metacrustic stretch has taken place.

If we now go back to bar 3, we can ask ourselves whether the effect of BPs 17,18 and 19 in the graph of Figure 5.27 is one of "resistance" as well. Is BP 18 a case of extra tempo increase or alternatively, is BP 17 a case of extra tempo decrease? This last interpretation is case d in Figure 5.31. I call it "**drooping**", describing its effect of further "rushing" the prevailing process, which in this case is that of a descent (in contrast to case c, the "pushing" effect, where there is an extra effort to rush through the ascending momentum process). As in all cases, it's hard to precisely quantify these structural processes and come up with a recipe that can point to each expressive effect. Careful listening tells me that in this case the effect is one of "drooping": when the following downbeat is approached through a weakened Anacrusis, the tempo decrease during the fifth quaver beat sounds particularly pronounced, causing this "drooping" effect. Normally, as we approach a new beginning accent, the tempo increases until the very last moment when we have the expected tempo drop, necessary in order to prepare the new beginning. In this case, tempo decrease does not only start early (from BP 15; fourth quaver beat of bar 3) but it also takes a sudden extra drop. Not even in bar 1, where we had a very weak Anacrusis through a tempo and dynamic decrease during the second half of the bar, was there so sudden tempo drop. To compensate for this extra tempo drop, during the last quaver beat of bar 3, we have an unusual tempo increase at the approach of the new bar. All of this can also be visualised in the tempo graph quite clearly. Notice the proportions of the "S" tempo pattern in this bar, which has shifted towards the right bottom side, in contrast to the more normative one which tends to begin and end at the same point, if not end a bit higher, in order to support a stronger Anacrusis.

Of particular interest is also the way the "S" pattern of bar 4 is shaped, minimising the length and strength of the Anacrusis by prolonging the Metacrusis to the very last beat of the bar. What dominates in this bar are three -- patterns interrupted by a ++ "pushing", and a -+ "resistance". The early occurrence of the tempo peak on the second quaver beat takes away the forward momentum that an "S" pattern usually accumulates as it progresses. The emphasis on the decelerando phase is further reinforced by a "drooping" effect right before the new beginning accent (BP 23), something that demands a final ++ pattern in order to balance the previous tempo drop and avoid any undesired break in the musical flow. As in the case of "pushing" and "resistance", "drooping" and "hesitation" are related (since in both we have an energy drop), and what distinguishes them is the direction of the underlining process.

In reflecting on these expressive effects, I find that their importance lies in both the use of more qualitative and intuitive descriptions for otherwise structural patterns of a more abstract nature, and the understanding of surface-level structural details from a more higher-level perspective. At a local level, for example, I could describe the opening Metacrusis of bar 4 by the --++ pattern that shapes the first two quaver beats. At the broader level, however, after I process the function of all these surface-level details, I could also talk about an overarching -- Metacrusis of five quaver beats, interrupted by two local patterns (++ and -+) that delay the descent. Another very characteristic delay of a much longer descent occurs in bars 6-8: after a smooth metacrustic stretch around BP 32, we have two instances of "resistance" at BPs 36 and 38, following which the descent continues with a pronounced "drooping" at 41 and a final smooth metacrustic stretch around BP 44. Again, the overarching process is that of a three-bar -- ME-DE adorned at the surface with various lower-level accents and special effects.

The middle section of the piece starting in bar 17 (see Figure 5.32), is an interesting example of how performance motives or gestures previously used in the piece are reworked in such a way so as to make possible a very effective transition between the A and A' sections. Effective reuse of motives is also made by the composer himself, who takes the opening motive and gradually transforms it from a more neutral and static idea to one that drives forcefully into the return of the opening material.[255] When it appears in bars 17-18, the opening motive has no longer the clear AN-ME profile of the opening motive. The modified melodic direction of the first half of the motive, together with the new harmonic context, rather favour a prolonged ME throughout both bars (notice the E♭ suspending for most of bar 17 until the resolution on the third quaver beat of bar 18). Reacting positively to this structural change, Horowitz here reuses a performance motive previously used during the second (metacrustic) half of the main motive. This is the exact same "pushing-resistance-drooping" pattern we just saw in bar 4. The ones used here (at bars 17 and 19) are variations of this, an early metacrustic stretch followed by a gradual descent and final "drooping". Parallel to this process, one can observe a gradual reversal of the directionality of this performance motive, from predominantly metacrustic to anacrustic: initially this can be observed in the second half of these motives (compare how the second half of bar 20 is more forward-directed than that of bar 18; notice the greater acceleration and crescendo during the second half of bar 20). The crucial reversal of the process, however, happens at bar 22, when the characteristic "drooping" at the end of bar 21 is transformed, at the end of bar 22, into a very decisive "resistance". This encourages a series of even stronger "pushings" that will eventually help drive the music to the next section with a strong anacrustic motion (see the annotated tempo graph in Figure 5.32 showing this transformation process; note also how this gradual strengthening of the anacrustic drive of the section is reflected in the shortening of the motives themselves—from two-bar motives in bars 17-20 to one-bar ones in bars 21-25.)

[255] Note here the reference to two different kinds of motives: the first is one found in the compositional structure as shaped mainly by melodic/rhythmic structural factors, and the second is found in the performance structure and refers to characteristic gestural patterns used frequently by a performer.

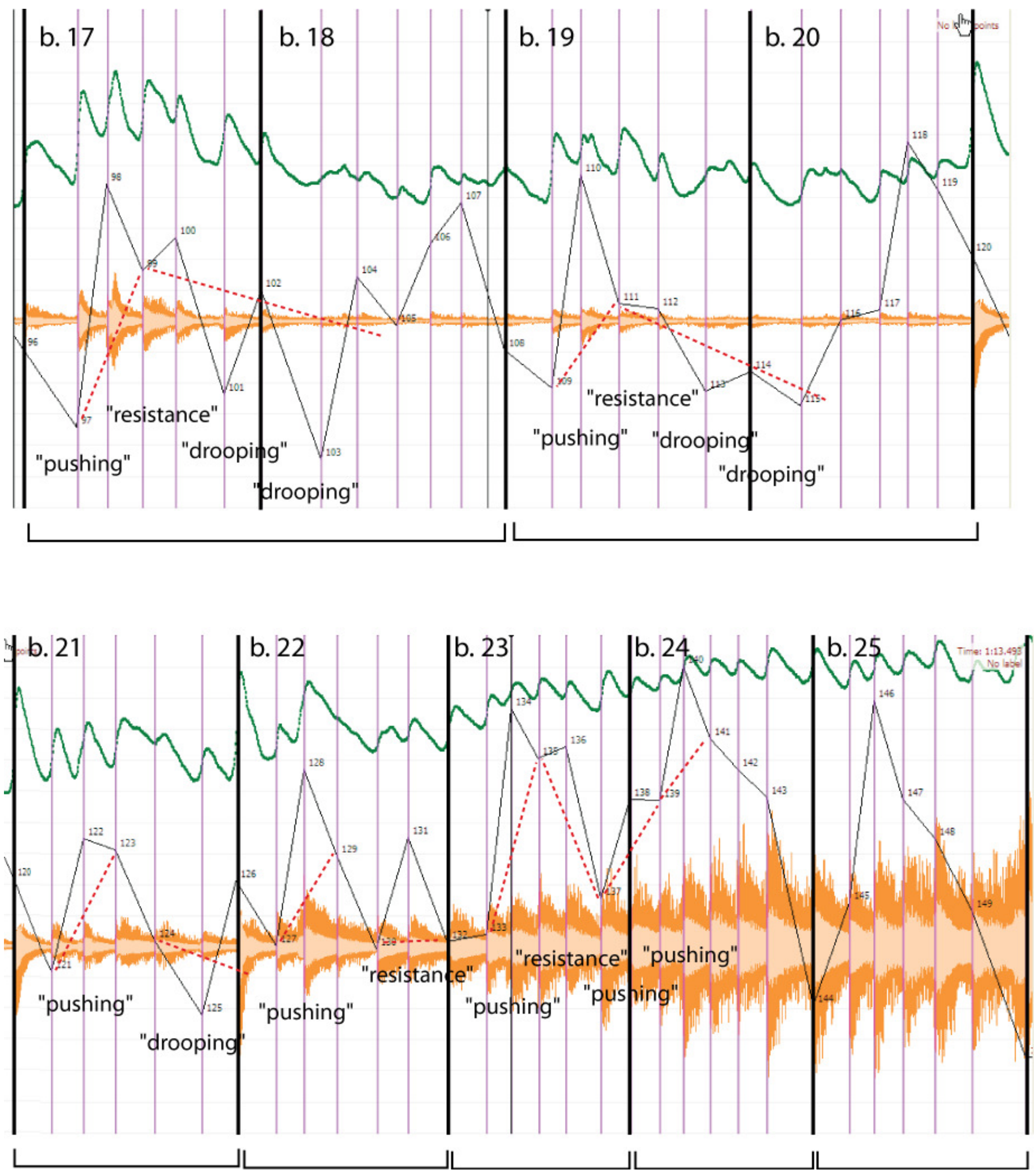

Figure 5.32 Tempo and dynamic fluctuation graphs of the middle section of Horowitz's performance of the Scriabin Etude. (*Media Example 5.18* SV video capture of Figure 5.32.)

The final two expressive effects shown at Figure 5.31e and f can be thought of as more extreme cases of a and c, and of b and d respectively. A "**surprise**" effect can occur anywhere and is the result of hearing an event happening much sooner than expected. This early occurrence of an event is usually accompanied by a sudden increase of dynamic value too. Thus, the most typical DT pattern associated with this effect is a ++ of significant strength. A good example of a surprise effect has already been given in Figure 5.11. Even though the surprise in Figure 5.11 occurs on the downbeat, where the expectation of an emphasised event is quite high, it nevertheless catches the listener unprepared. This is because listeners generally expect a tempo delay right before the downbeat rather than a sudden increase.

The opposite effect—"**hiatus**"— is a more extreme case of experiencing a delay of the expected occurrence of an event. It most commonly occurs right before an expected downbeat, playing with the strong expectation of a new metrical beginning by the listener. A way to make this "hiatus" more effective is by suddenly interrupting a ++ anacrustic movement into the expected downbeat through a pronounced drop in both tempo and dynamics: characteristic examples of this can be seen in Figure 5.33 below, at the approaches of bars 4, 6 and 8 (it is graphically represented by the symbol "//"). In relation to this example note especially the sudden change of direction of tempo at BPs 29 and 41, but also those at 32 and 44, which also involve "hiatuses". In fact, the whole performance of the Chopin Prelude by Evgeni Kissin is full of such hiatuses, which occur not only at beginnings of notated bars but even at their middle (approaching BPs 27, 33, 39 and 45). This gives a very special character to his interpretation, which in combination with his fast tempo, leaves the listener breathless. One structural feature that distinguishes "hiatus" from "hesitation" is this "breathless" quality of "hiatus", which is partly caused by a generally faster tempo and an accentuation right before the momentum break.

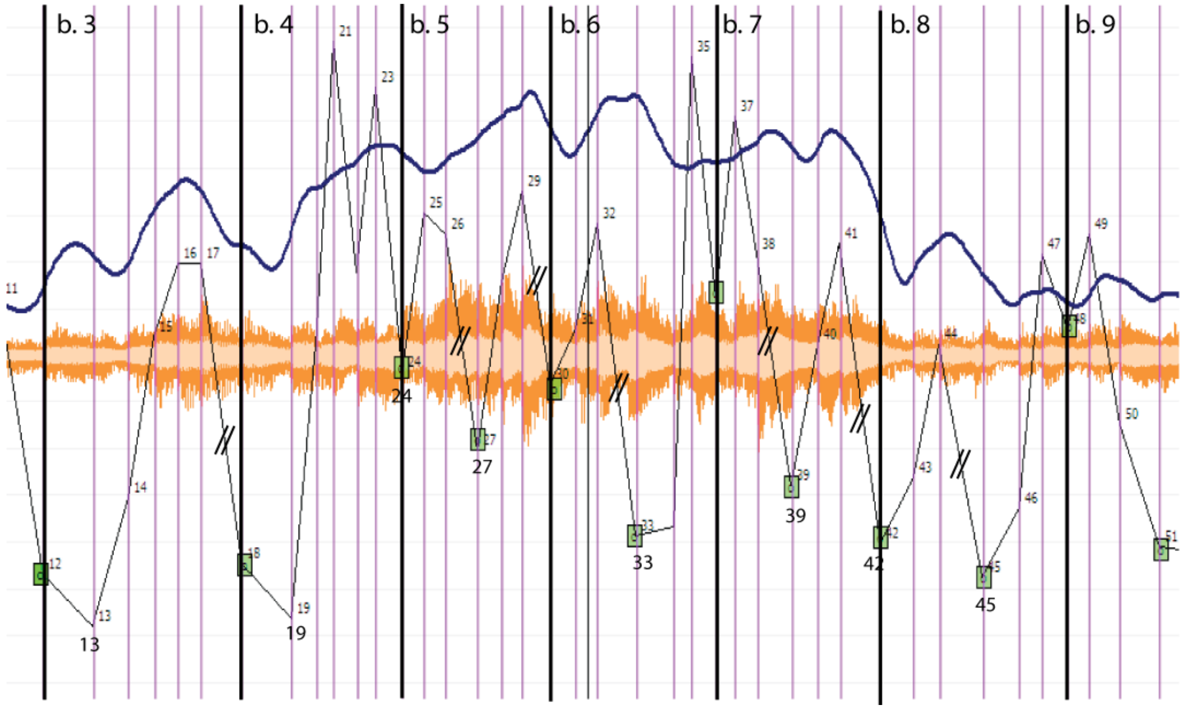

Figure 5.33 Evgeni Kissin's performance of Chopin's Prelude No. 17, bars 3-9 (for the musical score see chapter 1). (*Media Example 5.19* SV video capture of Figure 5.33.)

Another excerpt from the same performance of this Prelude, shown in Figure 5.34, an upward sequential repetition of a two-bar motivic idea, sounds particularly breathless. Again here, we have the same tempo patterns, with a sudden change in direction at BPs 116, 119, 126, and 131. What's unique here is the way the effect of "hiatus" couples well with that of "pushing": each of the two pairs of "∩" tempo patterns in bars 20 and 22 occurs within the context of a rising chromatic movement in an inner voice, which itself is part of the larger-scale sequential motion. This encourages the performer to "push" further this ascending movement through exaggerated ++ patterns during quaver beats 1-2 and 4- 5 of bars 20 and 22. Thus each exaggerated "pushing" does not only give way to the following hiatus but makes it even more breathless.

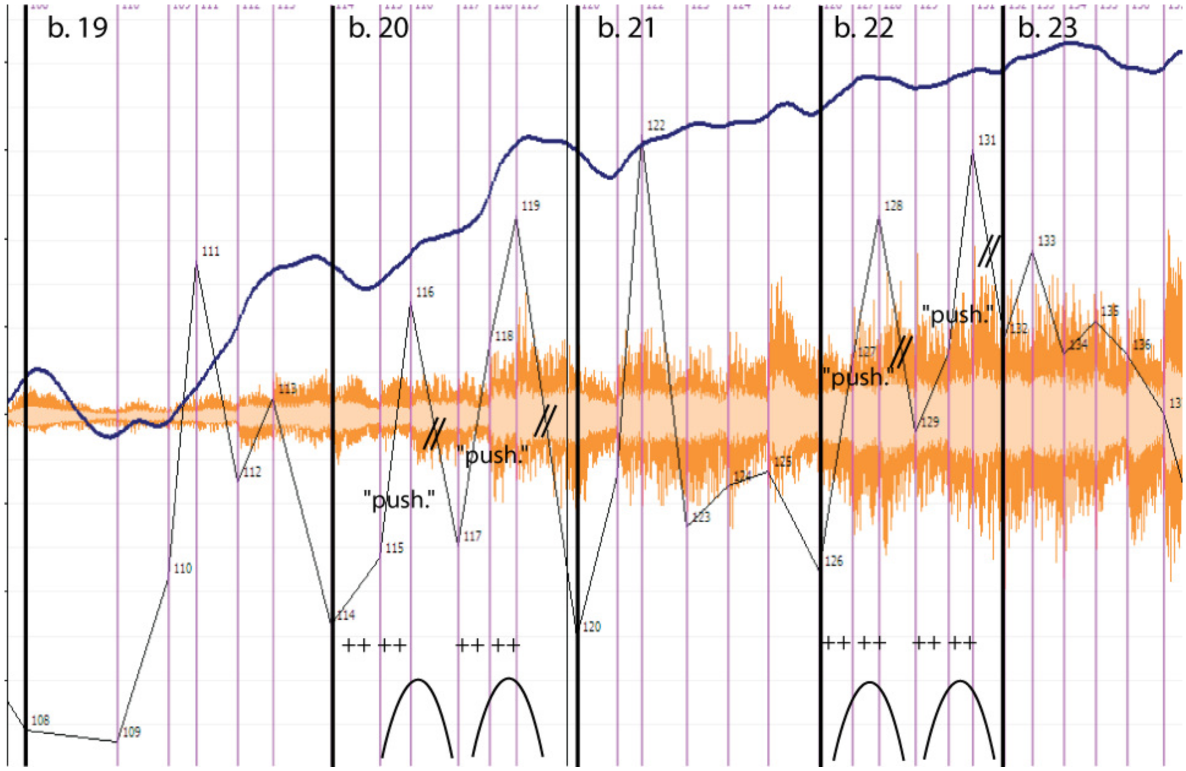

Figure 5.34 Evgeni Kissin's performance of Chopin's Prelude No. 17, bars 19-23 (for the musical score see chapter 1). (*Media Example 5.20* SV video capture of Figure 5.34.)

The six expressive effects in Figure 5.31 are particularly useful in describing the general performance style of a performer or of a performance. They can be used in addition to making other general observations about the way various expressive gestures are shaped. If Kissin's performance of the Chopin prelude is dominated by "hiatus" and "pushing", Horowitz's performance of the Scriabin Etude very skilfully combines the first four expressive effects to shape a very rich and complex narrative of expressive nuances. Below I will sketch a broad analysis of this narrative in order to complete the discussion of Horowitz's performance of this piece.

What's immediately striking in this performance is the way processes of opposing quality succeed one another at different levels of structure. The seed of this play of opposing forces has already been planted in the compositional structure, and Horowitz chooses to explore their full potential. The main motivic idea of the piece makes this statement right from the beginning. A predominantly anacrustic first half is answered back by a predominantly metacrustic second half. At the same time, within each process there exists a process of opposing quality, undermining its purity and creating a more open structure that demands further developing. The forward-moving quality of the ascending melodic line of the first bar is undermined right before the following downbeat by the change in melodic direction. Similarly, the anticipation of the resolution of the suspended note in the second bar through a dotted rhythm seems to resist a passive acceptance of a weak metacrustic answer. As a result of these incomplete opening processes, further development follows in the form of sequential build-up. As a balancing reaction to this sequential ascent, the final descent lasts not for one but for three whole bars. And of course this descent does not happen without any obstacle—as the adventurous left-hand inner line makes clear, through the insisting ascending melodic lines.

Unlike other pianists, Horowitz does not just acknowledge these structural details but brings them in and out of the surface at will in order to shape his own unique story. This story seems to lie more on the "weak" side, choosing not to overemphasise the more confident and optimistic ascending movement. In line with the overall character as suggested by the compositional structure of the piece, he prefers to convey emotions of melancholy, longing, and disappointment. While other pianists (including Scriabin himself) play the opening motive with relatively high strength and optimism, Horowitz, as we've seen above, starts with a very weak anacrustic motion. Not only does he gradually build up the strength of the anacrustic first half as the sequential repetitions build up forward momentum: he even undermines their strength by spreading hesitating moments here and there. The already weak metacrustic processes are further weakened by the very frequent "drooping" effects that convey a sense of resignation and disappointment. Instances of "pushing" and "resistance" are not strong enough to be read as moments of optimistic strength: their effect is rather as the remembrance of an unsuccessful attempt at reaching some desirable goal.

Epilogue

Playing with Gestures

6.1 «Alice»: Engaging students through story telling

"Alice" is a computer program that allows one to tell a story by creating 3D animations.[256] The program is designed in such a way as to make it easy and fun to create animations, a video to share on the web or even an interactive game. Its drag-and-drop graphic interface bypasses any technical issues, facilitating thus a more engaging and creative programming experience. From a list of pre-drawn objects and predetermined movement patterns and various other specific functions and procedures, the user can put together complex animated stories that would have been very difficult and time consuming to do by most other means.

Alice may look like just another fun game, out of the so many that already exist, but in fact it is very unique in kind, with goals that go beyond mere entertainment or even edutainment. It was developed by a group of researchers at Carnegie Mellon University with the aim not simply of entertaining or developing one's creativity but of teaching something very specific and otherwise very technically and intellectually demanding: it is a teaching tool for introductory computing, a student's first exposure to object-oriented programming. It comes to address the problem of the decline of incoming computer science students as result of the increasing complexity of computer programming.

The difficulty with learning a programming language such as Java or C++ without prior knowledge of similar languages is that one has to learn at the same time both the structure of the so called object-oriented programming (which is highly abstract and complex in itself) and the specific programming language, with its own complex grammatical and syntactical details. It takes a lot of effort for beginning students to get a good grasp of the basic programming issues involved, let alone move to more advanced and complex issues, which are necessary in order to become a professional programmer. As a result, students will

[256] See promo video at http://www.alice.org/index.php?page=what_is_alice/what_is_alice. (Last accessed on 14 Sept 2011.)

either be discouraged from continuing with a traditional programming class, or not even bother to enrol in one in the first place.

The advantage of Alice as a teaching tool is the way it introduces these programming concepts, relating them directly and very effectively to real life experiences, while staying away from the many technical details of the language. At the first stage, students do not yet engage in writing code, but learn the logic behind the structure of the language. As they create real-life animated stories, they learn how the various "objects" involved in the story relate to each other through various functions and procedures that make up the programming language. Through this intuitive and highly motivating 3D experience, they build a tremendous problem-solving sense while gradually learning to use the programming language effectively. As Steve Cooper notes, "the majority of children and adults are visual learners, and Alice teaches visually".[257] In addition, Alice has shown that it is possible to teach even something that is highly technical and demanding in the most fun and entertaining way. It has also shown that "computer science isn't just people sitting in cubicles writing code all day but people being creative, using the very powerful capabilities of computers to provide even more powerful and compelling results".[258]

Getting the technical details out the way and focusing on the functional relations between the various objects involved in creating computer programs appears to be a more effective first stage for learning computer programming. Those technical details are where music students find the most difficulty as well, consequently shifting their attention away from some of the most important aspects of musical meaning, such as musical expression and gestural movement. In traditional music theory and analysis, where the focus is on the way note structures found in the score are put together, the link between abstract theoretical observations and the more immediate, intuitive experience of music cannot readily be seen, if at all. Traditional music analysis is often seen not only as irrelevant to the students' performing or listening experience but also as just another kind of intellectually demanding theoretical exercise of questionable value. This is true not only for relatively advanced music analysis for college students but also for basic music theory as taught to children. The challenge for any beginning performance student involves having to both learn the fundamentals of music theory in order to read musical scores and cope with all the issues of technique relating to their specific instrument, including hand coordination, breathing and

[257] Promo Video, 1:45ff
[258] Randy Bryant, Promo Video, 2:12ff

other physical and mental issues. It normally takes years of disciplined study of any instrument in order to be able to learn how to play an instrument with relative ease and start freely expressing oneself musically during performance. It takes a while before students discover their (often) hidden musical talent, and by that time a lot of students drop out because they get discouraged by all of the hard work and patience needed to make the necessary progress.

Given the difficulty and amount of effort required in order to learn how to play an instrument, general music education in general schools tends to emphasise less instrument learning and more activities that involve music appreciation through movement, singing, improvisation and listening. Students are musically engaged with the minimum amount of theoretical knowledge and technical skills necessary in order to cultivate important musical faculties. At the centre of all of this lies the cultivation of musical intuition, through which musical understanding is achieved. Body movement has for long been seen as a very effective medium for achieving these goals, since the body has the ability to access important musical information in the most direct way and without much intellectual effort. Dalcroze Eurhythmics is one of the most well-structured and effective methods using the body. By moving the whole body to the music heard, students do a kind of musical analysis on the spot, a less systematic kind of analysis that is not written down in the form of a static graph but performed in space-time in real time with the music being analysed.[259] Like Alice, it's a way of studying music by telling a story, an "animated" real-body-movement story. However analysing music through real bodily movement is not always very practical for different reasons. In order to be able to effectively organise a eurhythmics class, the teacher needs to have not only special training but also a specially designed classroom with enough space for students to move around. Moreover, whole body movement constraints and intimidation factors discourage students from freely expressing themselves to the music. Solutions to some of these problems exist, such as having one move to the music only by using one's hand, which can generally move more freely, in conductor-like movements.

[259] My use of the term analysis here has a broader meaning than normally used in musicological circles, referring to any act (intentional or not) of parsing the musical surface in different ways, either by moving to the music, drawing a squiggle or using any conventional analytical tool. That means that even someone who dances in a disco with relative sensitivity to the music is essentially doing some kind of basic (and indirect) music analysis.

Such a method, however, is perhaps too improvisatory and unsystematic, and relies on intuition more than most traditional music theorists would be willing to incorporate in their teaching. As an alternative solution I offer below some speculation as to how the bouncing ball idea first introduced in Chapter 3 could be used to combine the most desirable features of both eurhythmics and traditional theory teaching.

6.2 The "Bouncing Ball": Analysis through virtual movement

Imagine a computer program, which allows you to very easily create an animation of a bouncing ball moving expressively and in synchrony to the music (see Media Example 3.3).[260] As I explained in chapter 3, in order to capture the full complexity of expressive movement, this bouncing ball, while preserving a lot of the essential characteristics of a real bouncing ball moving in space-time, is allowed to move more freely in virtual, musical space-time as demanded or shaped by imaginary (metaphorical) musical forces. (Notice how, for example, this bouncing ball bounces on multiple imaginary surfaces in order to capture the hierarchical structure of music, or how its speed profile can take a variety of patterns in order to reflect the changing dynamic of the experience of musical flow.) This animation could be done by referring to and analysing the musical score, or more intuitively, relying solely on the musical ear. The animated movement of the bouncing ball could be created by selecting movement patterns from a list of pre-drawn shapes, by using a free-drawing tool on the screen of the computer, or even by free-moving hand movements through an interactive video game device such as the popular "Wii remote" or "Kinect". In either case, and unlike eurhythmics, the final product of your activity would be recorded on your computer, providing you the chance to visualise or play it back so that you can evaluate it and make the necessary adjustments. The goal product is the animation, which, like any other kind of analysis, aims at explaining or illuminating an aspect of the structural meaning of the music, in this case its motional or gestural content.

While this animated product is interesting, fun and revealing in itself, what's most important here is the process involved, the means by which this animation is created and its ultimate pedagogical value. Firstly, this kind of analysis can be done by one with relatively

[260] No such a program exists at the moment. The specific animation was created through a rather laborious and time-consuming process (and therefore impractical for analytical or teaching purposes) using a professional animation program.

little knowledge and experience with music. It can be done by children with no musical knowledge as a fun musical game activity or by a more advanced music theory student who wishes to undertake a concurrent detailed study of the score in deciding the appropriate movements to match the music. In either case, the choice of how the gestural animated movement patterns are organised reflects either a conscious or unconscious analysis of the music itself as heard and bodily felt and/or seen in the score. The process of grouping three low-level movement patterns in a single higher-level one, for example, is an analytical act or statement reflecting the way the motional content of the music is (or could be) bodily experienced, which itself directly relates to formal, phrase, motivic, harmonic, rhythmic, and other structural aspects of the music. At the same time, apart from such more basic structural aspects, one can observe details of performance expression, which can be recorded as fine movement details of speed and direction of the bouncing ball. (Everything discussed in Chapter 5 about performance expression in relation to the arrow graphic representation applies equally to the Bouncing Ball.)

Secondly, this can be done in the privacy of one's own room and computer at home, and even though one does not necessarily have to make overt physical movements during this process, the involvement of bodily intuition and kinaesthetic awareness is inevitable. The analytical language—that is, the virtual movements of the bouncing ball—is such that, in order to make analytical judgments, one must think through the body. The bouncing ball movements visualised on the screen in synchrony to the music serve as a mediator between the music and a listener (literally or imaginatively) moved by the music. Rather than moving to the music with overt dancing-like movements, one could simply move empathetically to the bouncing ball either in imagination or with subtle internal muscle movements. Larger body movements of the hand or other parts of the body are of course an option as well. Any asynchrony between the way the music urges one to move and the way the ball does is experienced as a form of rhythmic dissonance in one's body, demanding the appropriate modification of the virtual ball movement by the user of the program.

In addition to providing a fun and engaging tool for musical analysis, this process of identifying oneself, so to speak, with the bouncing ball helps to sensitise one to the expressive, motional aspect of music. It is a less intimidating kind of analysis, doing away with complex theoretical jargon, and by emphasising the motional content of music, it directly relates to the more immediate, visceral aspect of our experience. It is also a kind of analysis particularly relevant to performers who shape music through overt physical gestures. By training the body-mind to control the way the muscles of the whole body respond to dynamic, expressive qualities of music, one is better able to control such processes during performance. (Here I am not talking about those specialised kinds of performance movements that are instrument specific and have been developed after years of interaction with an instrument, but about a complementary and higher-level type of movement control that relates more to the shaping of broader expressive/gestural qualities than to the technical execution of note successions.) 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 externalise fine internal motional energies that originate in the mind, pass through the body and become sound during performance.

For theorists, who have interest in more conscious and systematic kind of analysis through more objective study of the structure of music, this new analytical tool provides new ground for exploration. It not only suggests a new way of looking at the note structures of the musical score by focusing on the motional content of music, but also gives performance expression the attention it deserves. To this, the contribution of computer software such as Sonic Visualiser, which allows one to create and visualise important performance information, is very valuable. The availability itself of tempo and dynamic graphs, however, does not necessarily guarantee any interesting and useful analytical or pedagogical results. The specific analytic approach, as I have argued here and in the previous chapters, is very crucial.

What's interesting, though, is that even the simple process of just creating a tempo graph with the help of a program like Sonic Visualiser is insightful and rewarding in itself. Until some newer version of Sonic Visualiser (or some other program) will allow an automatic generation of tempo fluctuation graphs, one will need to generate them semi-manually. One first imports the sound file of a piece and sees on the screen the wave form of the music running from left to right. While plugins are available that can locate the onset of more or less every note played (see the spikes on the bottom of Figure 6.1, generated by Craig Sapp's "Spectral Reflux: Scaled Spectral Flux Function" plugin created for the CHARM "Mazurka Project"),[261] there are at present no entirely satisfactory means of automatically processing the rhythmic and metric structures of the music in order to mark the

[261] For more information on the CHARM "Mazurka Project" and the various tools created for that purpose see http://www.mazurka.org.uk/.

beat structure.[262] For this reason, the user needs to manually locate the beats, first by tapping the beat along with the music, a process which records the locations of the taps as vertical lines as seen in Figure 6.1. Then, since it is practically impossible to tap them in perfect synchrony to the beat structure of the music (note how in Figure 6.1 the vertical lines do not align with the automatically generated note onset spikes), the recorded taps are, again manually, moved around on the screen to coincide with the corresponding note onsets.[263] Despite the mechanical aspect of all this, the process of tapping the beat along the music gives the user the chance to experience the performance expression of the piece in a way that a mere listening of the music or visualisation of the tempo graph could not provide. Imagine having to tap the beat of a Horowitz performance of a Chopin Mazurka. The high unpredictability of the precise location in time of each beat makes the tapping process challenging while at the same time giving one the chance to physically experience the particularity of the expressive power of the tempo fluctuation of the performance. The whole tapping process is an interesting exercise in synchronising one's attention and body to the expressive movement of the music. It is a constant play with subtle processes of expectation of when the next beat might occur. What's interesting to observe from this experience is that these processes of expectation shift one's attention to specific goal moments each of which has its own unique weight and expressive power. Through this act, therefore, the user gets a very direct, first-hand bodily experience of the gestural processes involved in the experience of someone else's music performance.

[262] The various plugins available at the moment that automatically track the beat and metric structure of music are not yet very accurate and reliable.
[263] For more information on working with Sonic Visualiser and the various available plugins for musicological purposes see Cook and Leech-Wilkinson's "A musicologist's guide to Sonic Visualiser" available online at http://www.charm.rhul.ac.uk/analysing/p9_1.html.

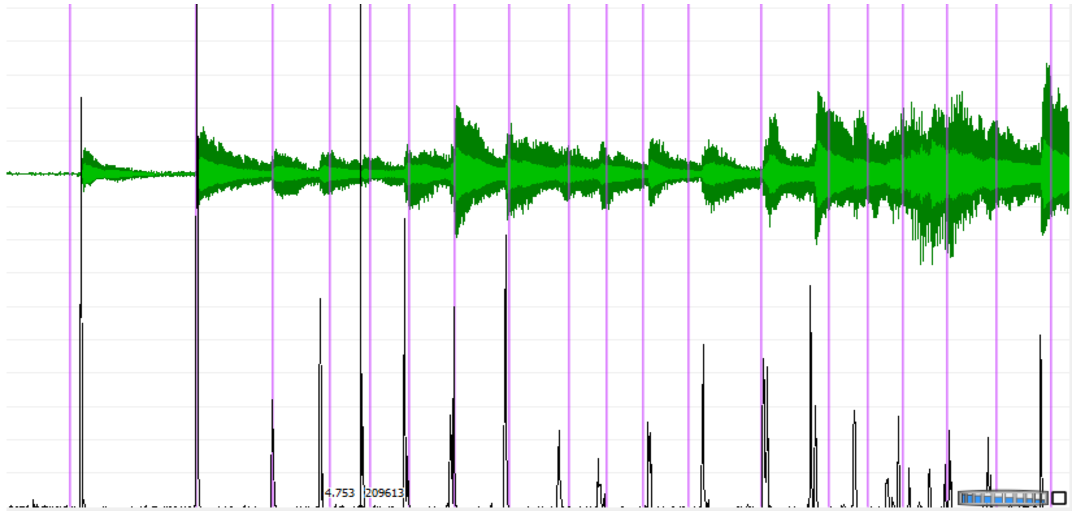

Figure 6.1 Timing data capture process in Sonic Visualiser: showing the wave form of the imported sound file; the manually recorded taps (vertical lines); and the automatically generated note onsets (spikes).

6.3 Structuring expressive movement

While the bouncing ball describes music-gestural processes in a more visually interesting way, it is perhaps the arrow notation that provides a more suggestive, qualitative, as well as more structured description of the gestural function of expressive movement. It goes a step further than the bouncing ball, breaking down the continuous flow of gestural motion into meaningful parts, reducing its content to a limited number of specific gestural processes or gestures. This not only helps to concretise expressive movement, but also provides a more practical graphic language and analytical system.

Unlike the bouncing ball, which depends on some computer program to generate an animated analytical representation, the arrow notation can easily be graphed by hand either on the musical score, as part of "voice-feeling" graphs (recall the various examples in Chapter 2, where only the basic gestural type was shown), or on a separate graphing layer showing more detailed gestural information. Both tools, however, are important since the meaning of the more abstract arrow gestures can be properly and fully grasped only when directly related to real physical movement. For example, an anacrustic gesture notated by a forward-pointing arrow does not represent a mere conceptual movement from, let's say, a pick-up melodic idea into the downbeat of the following bar. It is a conceptualisation and static graphic representation of the overt or imagined movement experienced while listening to or performing this melodic idea with increased bodily sensitivity. It is no coincidence that the metaphors we use today to describe the way the notes relate to each other are largely based on our everyday life experience of movement in real space-time.

If such abstract conceptualisations can closely relate to our bodily experience of music, they can provide useful and effective teaching tools. If properly used in a well-structured manner, they can help students learn how to express themselves during performance from the inside out and avoid interpretations that are the result of mere imitation of other performances or of obeying someone else's (for example their teachers') performance directions. While this gestural language can provide a more effective means of communication between teacher and student (than the "arcane sign-gesture-and-grunt system" of communication, to repeat Kerman's words), it still cannot guarantee the best results if only used unidirectionally from teacher to student. The students should rather learn to make their own expressive choices after they first learn how to see what those choices are and how to turn them into performed sound. As previously suggested, they need to learn this in two important interrelated stages: first how to "see" and bodily respond to the expressive potential of the compositional structure (that is, its inherent motional content); and then how to reshape this inherent expressive potential in different ways at will. After these two stages are mastered independently, one learns to process them at the same time during performance: one reads and plays the notes in a score, reacts to their expressive potential, and at the same time expressively shapes their motional character as desired.

The first thing this gestural language achieves is to *guide* one's experience of the dynamic motional content of structure. (It is not obvious to most people, that is to say, what this content is, how it feels and can be conceptualised.) Let's say you have in front of you the score of Brahms's "Wiegenlied" Op. 49, no. 4 shown in Figure 6.2a. You are trying to play or sing the opening vocal phrase, bearing in mind the specific gestural processes suggested by the language (i.e. AN, ME, IN and DE). As you do so, your attention and kinaesthetic sense immediately searches for some possible goal moment towards or away from which rhythmic energy will flow. If no attempt is made to go against the expressive potential of the compositional structure, the resulting experience for this excerpt will most likely correspond to anacrustic gestures, leading into shorter metacrustic ones, for each bar-long phrase divided across the barline (see Figure 6.2b). In other words, the expressive potential or power of the opening bar-long motivic phrases in the vocal part will most likely drive one to perform the phrases this way. Analysing the structure of the music conceptually, through the theoretical system proposed in Chapter 4, should result in this same analysis (short notes on weak beats leading to a longer note on a strong beat tend to be experienced anacrustically). The difference would be that in the latter case the user wouldn't get to experience the embodied meaning of music as directly if at all.

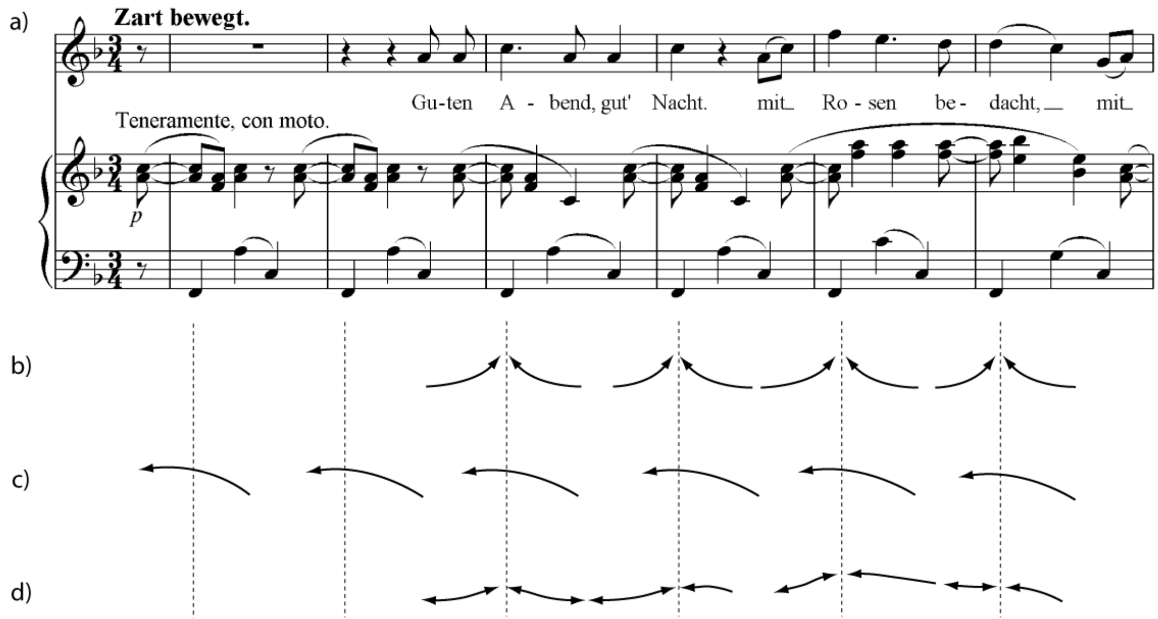

Figure 6.2 Arrow gestural analysis of Johannes Brahms's "Wiegenlied" Op. 49, No. 4. a) Expressive potential of the vocal part; b) expressive potential of the accompanimental part; c) expressive potential of both the vocal and accompanimental parts.

For the sake of exercise, singing or playing these phrases with exaggerated anacrustic/metacrustic charge would help students to become more bodily conscious of the motional character of the music, as they gradually learn how to shape it at will during performance. Moving the body with exaggerated tilting movements from left to right while performing is one way this interpretation can be reinforced, with all the necessary tempo, dynamic and articulation interventions that these bodily movements will encourage. Having played for a while with this idea, the students could then move on to explore other aspects of the music's expressive potential. The syncopated element in the accompanimental figures, for example, encourages metrically-displaced metacrustic gestures, as shown in Figure 6.2c.

After the students gain bodily experience of the gestural character of the accompaniment, they can move on to see how it influences the character of the vocal part. Singing or playing the vocal part with the accompaniment tends to change the dynamic of each motivic phrase by shifting the goal moments earlier on, so that the metacruses in the accompaniment align with those of the vocal part. In the most extreme case, each motivic phrase would be shaped by a single Metacrusis, creating a feeling of displacing the barline a crotchet beat earlier. Practicing singing or playing the melody this way demands extra bodily awareness and involvement, due to the tension caused by going against the normative distribution of rhythmic energy within the piece. To do that effectively, one would need to fight against the anacrustic charge of the beginning of each vocal phrase and, in consequence, with the normative metric framework of the piece. The value of this exercise rests in the way it allows students to physically experience this structural conflict during performance, in contrast to a conventional kind of analysis, which would limit itself in a mere conceptual identification of the conflict.

This stage of physical exploration through isolating aspects of the structure of the music is very important in sensitising one to its motional character. Having mastered this stage, one learns to respond musically to various aspects of musical structure and shape them in performance in the most balanced manner. In the case of this song, an effective interpretation would be one that balances the two opposing forces in such a way that, in the spirit of a Lullaby, the energy of the music flows evenly on the surface, avoiding any obvious metrical feel. (See the analysis in Figure 6.2d, where the shape of each competing gestural arrow has been largely horizontalised to represent the neutralisation of their gestural strength.) The importance of conscious control of these opposing forces is that despite their balancing during performance, the one does not negate the other: rather they work together in a competingly dynamic way, so that the music moves forward in an expressively engaging way.

The exercise just described is of course not only useful and relevant to performers but also to any musician interested in deepening listening and understanding of music. It can be integrated within an aural skills class where sight singing is concerned not only, as it usually is, with pitch and rhythmic accuracy, but also with expressive shape. It can also be integrated with a more traditional theory class where harmonic function, rhythmic and motivic structures, for example, are not merely studied conceptually but intuited in a more bodily way. Recall the "voice-feeling" graphs introduced in Chapter 2, where Schenkerian voice-leading graphs were dynamically rhythmicised and related to bodily gesture more directly. Similarly, "emotivic" analysis explores the rhythmically dynamic character and relation between motivic structures.

In all of the above cases, gestural shape or process was considered only in its most simple form. No details of strength and precise distribution of momentum during its course of action were considered. Such details, presented in Chapter 5 in relation to the precise way dynamic and tempo fluctuation affect gestural process, involve a more advanced level of the study of performance expression. As a first step, students could be introduced to ways of conceptualising and analysing the structure of recorded sound, which directly relates to music expression in general and performance expression in particular. The analytical system elaborated in Chapter 5, suggesting how combinations of dynamic and tempo patterns (DT patterns) relate to expressive gestural movement, can help students observe details of expression not accessed through a casual hearing. While a mature musician has a more well-developed sensitivity to details of expressive nuance, a novice needs the guidance of a well-structured method as to how and what to hear. In addition to analysing expert performances, students could start learning how to shape different varieties of gestural types themselves. After they have learned to respond to the expressive potential of the compositional structure as described in the Brahms example above, they can start to perform gestures (AN, ME etc.) by controlling tempo and dynamics with more accuracy, as suggested by the various DT patterns in the matrices presented in Chapter 5. An exercise could involve, for example, singing or playing the Anacruses in the melody of the Lullaby (Figure 6.2b) with "++ ++", "++ +-", "-+ --" etc. patterns, comparing them and observing their expressive effect. Gradually they would start to shape expressive gestures in a more controlled manner, finally moving on to shaping more complex large-scale structures through a well-cultivated bodily intuition.

6.4 Performing through virtual gestures

Thinking actual DT patterns during performance or listening is not advisable, in the same way that thinking note structures, Schenkerian lines, Roman Numerals or other theoretical constructs can be distracting to a performer or listener. These are only part of a first step in becoming sensitised to and acquiring control of musical expression. To achieve that, however, as I've argued again and again, these theoretical abstractions would need to be related to (in order to engage) bodily movement. A way to further strengthen this link between structure and expressive bodily movement is described below, where the user of a computer program creates an expressive performance by controlling DT patterns indirectly through virtual gestures.

Imagine a different computer program now that can worry all about the technical issues of producing the sound of a chosen piece. The user would only need to worry about choosing the desired expression for that piece. One can therefore engage with shaping expression in performance even without having to know how to play an instrument or even read a musical score. (It could therefore also be used by non-musicians who wish to improve their listening and understanding skills in relation to performance expression.) This can be done by communicating expression through the use of virtual expressive gestures modelling kinaesthetic processes. The starting point would be the MIDI file of a deadpan performance of a chosen piece, mapped onto a metric grid, and with a simple gestural analysis using arrowheads and based on the compositional structure. As can be seen in Figure 6.3a, these initial arrow gestures would not convey much expressive information: like the deadpan MIDI performance, they would represent only a "flat" inexpressive performance. By manually altering the shape of these arrow gestures (that is, by dragging the lines through some easy-to-use drawing tool as in Figure 6.3 b and c), the corresponding tempo and dynamic shadings would then be modified in the sound file.[264] This mapping of gestural shape and DT patterns could be done automatically by the computer, referring to matrices like those described in Chapter 5. The important thing here is that users wouldn't control tempo and dynamics directly as independent variables but indirectly through the unified concept of gestural shape. For more advanced users, the program could also allow more direct control of DT patterns by providing alternative DT patterns to choose from for each gestural shape. The users' main job would be that of thinking expression through this visual graphic language. The idea is to allow users to experiment with how modifying gestural shape affects expressive nuance in sound. In trying to determine therefore which exact shape matches with the music heard, users would be encouraged to use not only their intellect but also and especially their kinesthetic awareness. As explained in the previous chapter, the parameters involved in

[264] Alternatively, these arrow gestures could be drawn by the user from scratch, providing more freedom about which gestural type is used and where it is placed.

gestural shape would be the direction and angle both the main part and tip of each arrow. This exploratory process would give users the chance to become more conscious of the way gestural bodily processes relate to expressive sound: it would help them become more sensitive to expression while listening, and gain better control of it while performing.

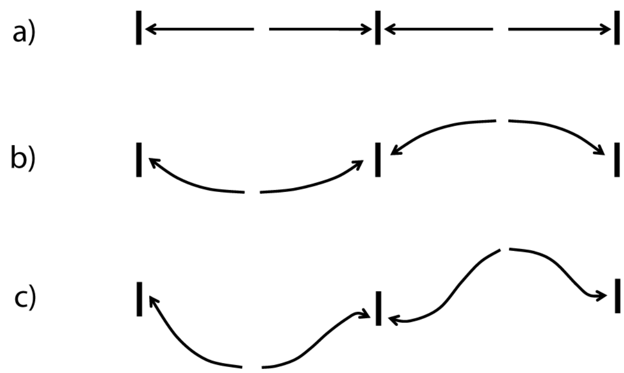

Figure 6.3 Exploring expression on a virtual instrument. A) Inexpressive deadpan performance; b) and c) adding expression through modifying the gestural patterns.

In closing, I would like to stress that the pedagogical tools I have proposed are by no means meant to substitute for real performance; they are only meant to help one explore musical expression from a different point of view, so that musical experience can be enhanced further, encouraging a deeper and more bodily engagement with music. This is achieved by providing a visual translation of expressive movement, which acts as a bodily reinforcement during musical experience. While a significant part of my work aimed at showing the link between musical structure and embodied gestural experience, the simplicity and intuitive character of the analytical languages I proposed allow them to be used as teaching tools for people with a variety of skills and musical knowledge, from people with special needs to the most advanced music professionals. The practical applications suggested here in the epilogue were only meant to show the range of different directions one could take. The possibilities are endless. Nevertheless, my emphasis on computer applications that provide a game-like multimedia experience is not coincidental. It reflects my firm belief that the future of music education lies in the effective use of computer technology in enhancing the learning process. But unlike a number of recent commercial examples in music gaming industry (see games such as the popular "Guitar Hero" or even more education-oriented ones such as the "Wii Music"), such attempts should be based on solid theoretical and pedagogical grounds so that successful results are guaranteed. This is where my work here has given the most emphasis: to provide a theoretical framework upon which practical applications can then be built.

In search of this theoretical framework, I considered essential first to examine in depth and then build on traditional theories and methods while at the same taking advantage of current research in various related fields. First identifying and isolating what I considered the most problematic aspects of existing music theory teaching, I then went on to synthesise those elements that could achieve my goal, which was to provide a method of analysis that asks for a more balanced and integrated use of both the mind (conceptual, intellectual thinking) and bodily sensation and movement. Following recent work on embodied experience, which stresses the importance of the bodily dimension of human experience in understanding musical meaning, I designed a language of expressive meaning that makes the connection between musical structure and bodily music experience more explicit. In this way I wanted to show how the various aspects and processes of music making and experiencing (composing, performing, listening) are united under some global dynamic quality that gives music its unique ability to move people.

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Appendix A

List of Terms

Anacrusis (**AN**): the experience of a forward-moving gestural process directed towards some future goal moment or beginning of a new motion cycle; one of the gestures used by the "arrow" analytical language, graphically represented by a forward-pointing arrow.

Bouncing ball visualisation: a kind of analytical language making use of the visualisation of a bouncing ball to capture the experience of expressive movement in music.

Decrease (**DE**): the experience of decrease of Musical Momentum, with backward-moving character of low goal direction; one of the gestures used by the "arrow" analytical language, graphically represented by a downward-directed curve or line.

Dynamo-Tempo (DT) graph: a graph produced by adding up the values of the dynamic and tempo graphs of a piece of music. The adding up is done by means of a specially designed algorithm, which first places each graph within the same range of values and then averages the values, after doubling those of dynamic fluctuation. It is an objective way of finding how dynamics and tempo fluctuation interact together to contribute towards shaping the unified force of Musical Momentum (note that Musical Momentum considers, in addition to these two factors, the contribution of compositional structure).

Dynamo-Tempo (DT) pattern: a pair of +/- signs describing how a given duration in musical time is performed, by specifying whether dynamics and tempo is increasing or decreasing. The four possible DT patterns are ++, +-, -+ and --. The first sign in each pair always refers to dynamics and the second to tempo. While these patterns only specify general direction of parametric value change and not specific amounts, they very effectively describe four combinations of these patterns that have a unique expressive effect.

Emotivic analysis: a kind of analysis of musical structure which traces the transformation of gestural processes at different levels of structure. "Emotivic" refers to the understanding of motive as bodily gesture as opposed to conventional "motivic" analysis which emphasises melodic transformation processes.

Expressive potential: the contribution of the compositional structure in the experienced musical expression. During performance, the expressive potential of the compositional structure acts as some kind of influencing force on the expressive choices of performers, who are free to play with, and reinforce, this expressive potential as they realise the notes into sound, or play against, and reshape, it in any way desired.

Goal Direction (**GD**): one of the three elements of musical motion or Musical Momentum referring to the goal-directed aspect of music, which could be either forward- or backward-oriented. In the case of AN, Goal Direction is forward oriented, representing the expectation one has for (or gravitation one experiences towards) a new cycle beginning or accent. In the case of ME, Goal Direction is backward oriented, representing the gravitation one experiences towards a newly-occurred beginning accent.

Increase (**IN**): the experience of increase of Musical Momentum with forward-moving character of low goal direction; one of the gestures used by the "arrow" analytical language, graphically represented by an upward-directed curve or line.

Metacrusis (**ME**): the experience of a backward-moving gestural process, originating from some goal moment or motion cycle beginning; one of the gestures used by the "arrow" analytical language, graphically represented by a backward-pointing arrow.

Metacrustic stretch: the temporary increase of Musical Momentum at the beginning of a metacrustic gesture before decrease takes place. This creates a characteristic stretching feeling at the beginnings of motion cycles, achieved most commonly by means of a tempo drop and dynamic accentuation during that part.

Motion cycle: the experience of one gestural cycle of musical motion delimited by two successive accents at the same level of structure. It could be graphically represented by a bouncing ball cycle or a gestural arrow cycle. Each motion cycle can take an endless number of different shapes, depending on the structural properties of the music heard. A **prototypical motion cycle** is the experience of two symmetrically-arranged and relatively strong processes of decreasing and increasing Musical Momentum (ME-DE-IN-AN). It is the simplest and most balanced type of motion cycle, modelled after the natural movement of a bouncing ball cycle.

Musical accent: refers to the experience of a motion cycle beginning at any different level of structure. No distinction is made between different kinds of accents based on their structural cause like most traditional theories of rhythm or metre; a musical accent's experiential quality is distinguished by the variety of different ways motion cycle beginnings are approached and left—i.e. by the specific shape and strength of each AN and ME approaching and leaving each accent, including the specific DT patterns associated with these gestures. Accent as defined here is thus all-inclusive, combining elements of metre, rhythm as well as of performance expression.

Musical Gesture: refers to a short music-gestural unit that makes part of a motion cycle. It can be one of the four phases of a motion cycle—ME, DE, IN or AN—and can be used to describe or graphically represent the motional or expressive experience of music.

Musical Momentum: the physical (bodily-kinaesthetic) or psychological experience of the overall dynamic, goal-directed energy flow of music. It comprises the three components of Musical Tension, Rhythmic Drive and Goal Direction and can be thought of as the unit of measurement of the overall experience of musical motion, which is graphically represented by the gestural arrow notation.

Musical Tension (**MT**): the experience of physical (bodily-kinesthetic) or psychological tension in response to music. It is one of the three components of Musical Momentum and can be understood by analogy with the experience of empathising with the change of the potential gravitational energy (or height) of a bouncing ball. It can also be understood as the static muscle tensing of one's body in response to music.

Passing effect: the effect of moving between two equally-weighted moments, where a beginning Metacrusis is equally balanced with an Anacrusis . It is part of the "voice-feeling" graphing system and it is graphically represented by a slur (or by slur with arrows on either side when gravitation towards each side is relatively strong, but equal) connecting two notes with one or more notes in between. It is a redefinition of the traditional notion of passing motion, where the focus is more on melodic stepwise motion within a harmonic framework, as opposed to dynamic movement in an integrated harmonic-rhythmic/metric field.

Performance Cube Matrix I and II: these two cube matrices organise in a quantified way the range of possible expressive choices in terms of the performance parameters of dynamics and tempo. The first matrix describes a range of different strengths of a given DT pattern: this is done based on the degree of change of each of the two parameters and on their overall Momentum strength—the sum of the average of the beginning and ending values of tempo and dynamics of each gestural pattern. The second matrix describes a range of different expressive profiles a gesture can take in terms of combinations of two successive DT patterns. Each of the four slices of the matrix, representing the four gestural processes of AN, IN, DE and ME, contains 16 pairs of DT patterns, arranged in order from the one inducing the most to the one inducing the least Musical Momentum.

Rhythmic Drive (**RD**): the physical (bodily-kinesthetic) or psychological experience of the forward-moving aspect of music. It is one of the three components of Musical Momentum and can be understood by analogy with the experience of empathising with the change in the kinetic energy (or speed) of a bouncing ball. It can also be understood as the feeling of the urge to move forward.

Special expressive effects: expressive effects shaped by performers through tempo fluctuation at the most surface level of structure. They arise out of local breaks of the surface of otherwise smooth underlying processes of tempo fluctuation. Depending on whether we have extra amount of increase or decrease of tempo within processes of increase of decrease, the expressive effects defined can be those of hesitation, resistance, pushing, drooping, surprise and hiatus.

Stasis (**ST**): a more rare gestural process, where no change in Musical Momentum takes place, describing the experience of a static musical effect.

Voice-feeling graph: a graph used to communicate the dynamic, gestural content of voice-leading connections in music. They resemble Schenkerian voice-leading graphs in that they use note heads and stems and reduce some of the content of the music analysed but they differ in the way their emphasis is not on structurally more important notes but on dynamic processes towards and away from goal moments as well processes of tension and release.