

Learning complex piano music: Environmentalist applications

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Abstract: The current paper started as a pianist's enthusiastic response to environmentalist ideas developed by Mark Rowlands in his book *The body in mind*. His description of the manipulation of appropriate information-bearing structures in the environment of organisms as a form of cognition can, in our opinion, suggest an alternative to dominant mind-centered concepts around the learning processes for highly complex piano music after 1950. Our presentation will initially employ environmentalist ideas as a powerful tool of reflection on established modern approaches to piano playing, through a brief comparison of treatises by the pianists and pedagogues Leimer-Gieseking and G. Sandor. The conclusions will be extended to the issue of developing appropriate learning strategies for complex postwar piano repertoire, in relation (and most often contrast) to current theorization in the field of complex music performance practice. The general theme, which eventually comes into focus, is the problematic ontological status of the performing body in the practices of notated music in the West. As a result, this paper will not only attempt to propose environmentalist applications to learning and performing complex piano repertoire, as opposed to established approaches based on an abstracted, disembodied musical thinking; it will also look at how environmentalism and the repertoire in question can suggest ways in which the corporeality of performance becomes a "[...]problem in the positive sense-not just as an 'obstacle', but as a vehicle for thought and action" (Osborne,1996:192).

The development of western music notation, along the line of an increased specificity of both the sound-image (descriptive function) and the performing instructions (prescriptive function) contained in a sacralized score, has radically affected the piano performer's primordial reflexes to the act of learning and performing. The very fact, that the score -a visuographic mode of representation- is the inevitable starting point of fixity for the whole learning trajectory, has privileged the eye and the mind as the performer's points of entry, in the expense of the ear and the performing body. But while the ear is at least implied through the signification of sound, the body, as the physical mediator between sign and sound, has been both a crucial *absence* in the notation and *the only performer-specific* field in the chain linking composers and listeners.

The problem almost remained muted through an (at least) four centuries-long development of performative traditions and the linguistically structured tonal music material itself into a sort of *lingua franca*. Despite local deviations and distinct lineages in those traditions, the notational medium was rendered quasi-transparent through more or less commonly accepted stylistic rules applied to performance. After all, 19th century saw the emergence of the star-performer who *becomes music* and the romantic ideals concerning talent, intuition, genius further mystified performance and disembodied notation. Of course, the development of virtuosity, very often inseparable from improvisation still active in those days, was a privileged field for experimentation with the performing body. Nevertheless, the fixation of the results in notation and the institutionalization of instrumentalist's education would ensure that "the unstable interface: performer/notation", a "deeply fragile and artificial" one, would remain "naively unquestioned" (Ferneyhough, 1995:5) as to its purely corporeal aspects.

Developments after 1950 in the piano repertoire made these aporias visible again: The unfamiliarity of the material and the non-linguistic, non-linear, and highly fragmented articulation of it, plus lack of performative traditions, restricted the possibility of tapping into a reservoir of common knowledge and ready-made answers. New notational features, such as the notational information overload and other novelties, obscured the accessibility of the mental image. While those developments triggered a new wave of virtuosity and some fresh, unmediated reflection on the performer-specific resources, the pathway to the body has been obscured again. Modern theorizing around performance tends to reproduce mind-centered ideas, in the form of a listing of heroic challenges and impossible tasks the performer is assigned, and his role remains strictly subservient to the composer's mind.

Environmentalism

This a paper about corporeality in learning and how this corporeality can itself be seen as environmentally constituted, not simply as the incarnation of an autonomous conscious mind. While it is indisputable that learning notated music does involve a major part of internalization of notated images and their translation into motions, we would like to explore what other points of entry and resources than the mind one might be using. It might be shown that the importance of the manipulation of external or-to put it in Rowlands terms-*environmental structures*, not only is equally important for learning (still:usually muted in current theory), but also that it can be extremely successful in dealing with the new problems posed by complex music. To put it in an almost simplistic way, where direct *understanding* fails, *acting* can point to refreshing solutions. Basic for the following argumentation will be the acknowledgement of the hybrid nature of learning to perform through both internal and external resources, in a way which privileges learning as performance, as an action itself.

Before we proceed with the examination of two treatises on piano playing indicative of both the privileging of internal cognitive processes and of some traces away from that theorizing, we would like to make a brief summary of environmentalism, as presented by Mark Rowlands in the second chapter of his book *The body in mind*.

Environmentalism suggests a very radical view of the nature of cognitive processes, in stark opposition to the Cartesian idea of a mind inside the head, which structures the world functioning as the exclusive locus of cognitive processes. In the author's words:

"Environmentalism is understood as the conjunction of an ontological and an epistemological claim: [...] cognitive processes are not located exclusively inside the skin of living organisms and [...] one cannot understand those processes by focusing exclusively on what is occurring inside the skin of living organisms[...]"(Rowlands, 1999:22)

A word of caution should already be uttered: As Rowlands himself keeps repeating throughout the book, environmentalism doesn't certainly oppose the fact that cognitive processes do take place inside the organisms' minds. What he does suggest, is that those processes are essentially hybrid in nature, partly consisting of physical manipulation of structures in the environment of organisms. In particular, the environment is conceived as consisting of information-bearing structures, which organisms can potentially identify and appropriate. This manipulation itself is identified as indispensable to the cognition: a form of information processing. The crucial point here is the proposition that "in performing any given task, the more information the organism can process externally, the less information it has to process internally"(1999:30).And this is a proposition towards the direction of maximization of efficiency by minimizing internal costs, epitomized in the principle which triggered the discussion in chapter 2: "don't multiply effort beyond necessity" (1999:22).

Some relevant argumentation will be presented later in this paper, in the course of our examination of potential environmentalist applications to learning and performing complex piano repertoire. But let us already stress, that one of the most exciting aspects of environmentalism, next to its different insight into practical efficient strategies, is the metaphysical claim: Mind and body are not disconnected subjectivities, but rather worldly in themselves, involved in a subtle net of interactions. Similarly, we will claim that the performer's drama as a consciousness trying to harness its body, the piano and the notated tasks with the power of the mind is just a privileged way to look at things, intrinsic to the way notation and practices developed. An alternative way is thinkable, which has efficiency and metaphysical results and can find a fertile field of application to the relatively virgin genre of complex music. This way considers the learning process as a hybrid one, partly happening internally (as in traditional accounts) and partly relying on manipulation of environmental structures, namely: the gravity, the body, the instrument , and the score.

Environmentalist traces in traditional piano treatises

We would like to start our account of possible environmentalist applications on the learning strategies adopted for complex piano repertoire with a short comparative study of two very influential treatises on piano playing: *Piano Technique* by Leimer and Giesecking (1972) and *On Piano playing* by G. Sandor (1981).

Both books are essentially presenting basic principles of what is usually termed "modern piano technique", a rationalized use of the human performing mechanism in the direction of effortless mastery of the mainstream piano repertoire. Despite some similarities, both books carry very distinct overtones of underlying preconceptions about the nature of the cognitive processes involved in learning pieces and performing them on the piano: Leimer and Gieseeking (from now on abbreviated to LG) develop a method which relies heavily on internalization through mental work away from the instrument, as a first and immanent entry point to the learning process; on the contrary, Sandor interweaves the performer's body and gesture, the instrument and the score in an interactive schema, which prioritizes a performer-specific feature as the entry point to learning: physical motions. If –in Rowlands' terms- we consider the score, the instrument and the performing body itself as information-bearing structures in the pianist's environment, then we will claim that LG's reflections are presenting us with a hard version of internalism in piano playing; while Sandor's account stresses an understanding of the process as hybrid: combining the pianists' internal efforts with an actual physical manipulation of those structures.

Before we go on with a more detailed account of these treatises, a word of clarification is needed in relation to the inclusion of the performing body in the categories of environmental structures: While we are aware of the fact that a latent Cartesianism might be at work in the perception of the body as a performing mechanism at the mind's will, we believe that it would be equally misleading to assume that the body as an incarnated subjectivity is separate from the world itself (a sort of corporeal Cartesianism). In an article-reference to Merleau-Ponty's ideas on perception, E.T. Gendlin writes "If we think of the living body not as a piece of merely perceived material, neither as perceiving, but as interaction with its environment, then of course the body is *environmental information*" (Gendlin, 1992). It is this interactive concept of the body which will inform its inclusion in our account of environmental structures.

We will begin our account with a discussion of the most important points of LG's *Piano Technique* (1972), originally published in 2 volumes in 1932 and 1938. We will identify their internalist assumptions in the use of the score and the use of the body; and we will connect them to Rowlands' discussion of cognitive tasks in relation to memory.

The foundations of the LG method, as manifested in the very first chapter of their first book *The shortest way to pianistic perfection*, are three: memory training through reflection; ear training towards the direction of absolute control of tone quality, for the smallest bits of the work; and what they call "natural" piano technique, employing the least possible physical strain. The ear-training principle, is complemented with two axioms, the urge for an absolute obedience to the composer's markings and the resulting substitution of the notion "interpretation" with the notion of absolute correctness. The last points will prove very useful later in this paper (in the discussion of Frank Cox's "High-Modernist Model of Performance Practice"), in showing the persistence of traditional trends in some of the most radical developments. But for now, let us concentrate on memory.

Throughout their book, Leimer and Gieseeking passionately advocate memorization of the score through internal representation away from the instrument, as the cornerstone of any subsequent learning process. In other words, the experience of performing on an instrument begins with a completely disembodied mental activity. Looking back to Rowlands and our own definition of the body, the instrument and the score, as the three basic environmental structures at the performer's disposal when starting learning, we realize that the LG strategy essentially does away with all of them: it ignores the two first and it wishes to re-locate the third to the performer's mind.

The LG memorization process, described elaborately in several examples in the book, consists of an exhaustive note-by-note and hand-by-hand verbal description of each individual measure of the score. This highly detailed analysis is also highly prioritized: pitch and duration as the barebones of the composition are exhaustively examined, while articulation and dynamics are not initially entering the mental frame. Structural observations are active in a relatively loose way, not with a rigid intention to grasp an overarching formal schema or reflect on the process. In other words, there is a moment-to-moment memorization process, which brings to mind the notion of episodic memory as exposed by Rowlands. In his discussion of memory, Rowlands suggests that the development of modern human memory has followed a clear path from the employment of episodic and procedural memory systems to the development of

semantic memory. The first two systems are primordial, still incompatible: episodic memory is employed for concrete, specific, detailed events in time and space, while procedural involves action patterns. Semantic memory on the other hand is a memory of facts, stressing some sort of semanticity in the bare events which constitute episodic memory. After all, the border between semantic and episodic memory seems to be so vague as to suggest that their difference is one of degree, not of kind. Rowland argues that the key to their actual differentiation and to this development of semantic memory has been the employment of external means of representation, such as visuographic (the music score is one of them), which are being seen as *external information stores* into which modern humans tap. This increased reliance of "civilized" people on these environmental structures is accompanied by an involution of episodic memory; on the contrary, relatively "primitive" peoples and children seem to make heavy use of episodic memory storage strategies, the fact itself puzzling the modern observer as outstanding "natural" or photographic memory. (Rowlands, 1999:123-129). Going back to the LG memorization process and under the light of those remarks, it looks that the balance between its episodic and semantic properties is considerably leaning towards the first. The highly localized nature of the description of the musical text, and the simplicity of the syntactic relationships observed, point toward an episodic experience of "being in one place at a time", only that this happens mentally, not in real time and space.

The LG's description of the process on the instrument continues along the same lines. A metaphor employed by the authors is telling about how the process is to continue: "When a part of a composition has been played for the first time, a picture of the same becomes imprinted on the brain. This picture varies in clearance according to the mental constitution of the pupil. In general, a very faint impression is left on the memory, similar to a photograph which is not clear or has been under-exposed. Through constant repetition the picture becomes more and more distinct and finally resembles a clear, sharp photograph" (1972:47). Again, the crucial point here is that an experience which is fully corporeal, or at least hybrid, is reduced in Cartesian fashion to an impression on the brain.

Internalism could not leave LG discussion of piano technique intact. The internalization of the notes is followed up with the internalization of technique: "By further development of the idea, one acquires the ability even to prepare the technical execution through visualization, so that, without studying at the instrument itself, the piece can be perfectly performed and this in a most astonishingly short time". (1972:11). The absolute banishment of the instrument from the learning process is later praised as an aim and even as a sign of superiority: "Only a very few of the elect are born with the talent of immediately and intuitively grasping the meaning of a composition, [...] practically without further practice" (1972:33).

A closer look at LG conceptions of piano technique shows that, while theoretically aligned with the efficiency axiom towards minimum energy expenditure ("natural" playing employing the least possible physical strain), it does highlight an understanding of a body under constant conscious control, and whose only source of energy is muscular; a body-tool in the service of the musical image. Some of the relevant notions would include: the conscious control of muscular relaxation and exertion; the muscular strengthening; the fixation of joints and avoidance of movement. As it will be made clear very soon, in the context of Sandor's book discussion, these three features, plus the manifested intention of an exclusively mental practicing, consider the pianist as an entirely self-contained system, who is dedicated to a perpetual quasi-biological development, both mental and corporeal. The reluctance to employ any structure other than the mind in the course of learning and performing is total-infact considered as a sign of weakness, almost inferiority, if it does happen.

Sandor's account in his own book *On piano playing* presents us with an altogether different concept which stresses the inter-activity of the elements involved in piano playing, what we termed *the pianists' external information-bearing structures*. For the sake of clarifying LG points on technique stated above, in Sandor's case we'll start with the technique and save his ideas on the use of the score for later. A quote from the very first chapter of the book, where basic ideas are formulated, will serve as a very good example of environmentalist traces: "In order to mobilize the playing apparatus and generate the desired speed in the hammers, there are no other but two sources of energy available: the force of gravity, [...] and muscular energy, [...]. Most of the time, it is the participation of both energy sources that provides the optimal solution. Our aim is to achieve the optimal results with the least expenditure of our

own muscular energy" (Sandor, 1981:7).

Here, we have a clear manifestation of the Rowland's manipulation thesis: Playing the piano is hybrid in nature, tapping into both internal and external resources; the aim of saving as much of our own energy as possible is achieved through the manipulation of a structure which is external to the performer's body, that is gravity. The LG similar requirement of experiencing the least possible physical strain through the mystified idea of constant relaxation consciously controlled by the mind, finds here a surprisingly environmentalist -friendly counterpart.

But are our bodies themselves to be considered exclusively as an internal resource at the mind's conscious control? Talking about relaxation, here's Sandor's take on the issue:

"Total relaxation is non-existent in piano playing.. Even when we rely purely on the force of gravity, we must use the necessary muscular equipment to lift and place the arm and hand in their proper positions. Most motions are executed by antagonistic sets of muscles: while one group (for example flexors) works, the other group (extensors) relaxes. Partial relaxation alternates with muscular activity at all times; complete relaxation exists only if we lie down and rest" (1982:7)

The idea of partial instead of constant relaxation foregrounds the issue of muscular interdependence: where LG advocate muscle-building and finger independence, Sandor stresses the need for complementarity and co-ordination:

"[..]piano playing is not a matter of muscular strength and endurance[..] Some of the muscles are small and weak, made for precision work, others are strong and powerful. If we can activate these larger muscles properly, we do not need to strengthen the weaker ones. We must learn the kind of coordination that enables us to put to use the necessary equipment and to play without any trace of fatigue [..]" (1981:16-17)

Notice how different the tone is very from the LG takes on the same issues: instead of being a field of perpetual biological development, the body is already a *locus of information* (such as the fact that smaller muscles can be supported by larger when the task in question demands it, or that gravity is collaborating with the muscles itself). This is *information*, not in a linguistic sense (as phrased in the previous proposition), but rather information about how can the body interact with the environment at less internal cost in the course of playing the piano. In this sense, the body can be seen as an environmental structure, where the performer can tap into, given that she is in possession of the right *code*. Thus, the manipulative thesis recognizing the body as internal and the gravity as external has to be reformulated: instead, there is a conscious part in the process of playing the piano manipulating two environmental structures: the force of gravity and the body itself.

We are reaching the point where the already examined and interdependent structures –gravity and the performer's body- have to be connected to the structure *par excellence* for notated music: the score. In his account of the development of modern humans' memory through an increased reliance on external representational systems, visuographic (such as the musical score) or not, Rowlands claims that "invention of such a system is inherently a method of external memory storage. As long as a person possesses the 'code' (and such possession presumably is constituted by an internal store of some sort) for a given set of representational symbols, the information stored in the symbol is available to the person" (Rowlands,,1999:142).

The code that Sandor develops is, ingeniously enough, performer-specific and score-related : it is grounded on the exclusive performer's experience in that it is corporeal, employing five motion patterns and four modes of touch (and their combinations), but not in the abstract; those correspond to exact visual patterns on the score. This "typology" of simple *visuo-gestural patterns*, which can be combined between them, allows a direct translation of the score into motion. The crucial point here, which will be very useful for our own applications, is that the model in question prioritizes very specific musical elements as starting points: *movement in space*, and subsequently pitch and pitch morphemes such as chords, as determinants of that space and that movement (and quintessentially not as *loci of existence* in the sense we approached the LG note-to-note treatment to pitch); *grouping of movement or isolation of events* (or to put it differently, *different degrees of continuity perforation*); *articulation and dynamics*. If we compare this account with the traditional priority to pitch and

rhythm accuracy, (where articulation and dynamics assume an almost decorative, interpretative role), we are certainly struck by the *absence of a prioritization of strict rhythm* and the utmost importance given to dynamics and articulation as definitive of the appropriate physical gesture.

Someone who has learnt this code, and has good music-reading skills, can now plug into the score, and engage in a simple pattern-recognition and pattern-completion internal process, translating automatically the information into gesture and sound. Of course, nobody could claim that all problems are solved: the refinement of musical detail itself, questions of extreme tasks such as speed, accuracy and control, even the idiosyncratic manifestation of these motion patterns themselves, are questions to be perpetually addressed. The point, though, remains that this code provides an environmentally-constituted interface between the performer and the notated music.

The mention of pattern-recognition and pattern-completion operations, as part of the Sandor code, stems from chapter 7 in *The body in mind*: Here it is argued that even some purely internal thought processes (such as mathematical calculation) can have their own environmental take, or be seen as hybrid, with an internal "pattern-mapping" component and an external "environmental structure manipulation" component. A multiplication of 3-digit numbers using pen and paper and an algorithm of small, easy steps, as environmental structures, is an informative example. What comes on the surface is a renewed and probably unexpected role for the "primordial" procedural memory, "a type of knowing-how to do things instead of knowing things" (Rowlands,1999:164).

Taking Sandor's idea even further, we would be tempted to suggest the following: At the time the performer makes the conscious decision to engage with a score, this is triggering an environmental system of several elements (the score, the instrument, gravity and his body), which interact towards the actual performance. In a zen - like sense, after this initial decision, not only does the performer play the piece on the instrument, but also the instrument plays(= regulates, controls) the body, by dictating the necessary adjustments, the body controls the performer (when for example experiencing some sort of discomfort/strain alarms the conscious mind that something is imbalanced and must adjust), and quintessentially the score plays the performer in that its visual patterns and requirements can automatically trigger motion patterns.;and so on, towards an infinite net of subtle interactions.

Environmentalism and Complexity

Current theorization

The second part of this paper will deal with some potential applications of the environmentalist ideas mentioned above to the learning process and performance of postwar II complex piano repertoire. In this account, recent trends in performance practice analysis will be discussed in conjunction with our own propositions.

In his influential article "Notes Towards a Performance Practice for Complex Music", F. Cox presents us with an elaborate analysis of the focal points and aporias surrounding the learning and performance of music falling into the "New Complexity" category. Cox's account of the new challenges posed by such work is measured in relation to what he terms the "High-Modernist Model of Performance Practice" (from now on abbreviated as " hmmmpp"), considered as " [...] a "noise-free", transparent relationship between all elements of the above mentioned communicative chain [between conception, notation, performance and reception]"(Cox, 2002:71).

In this hmmmpp, the idea of a fully deterministic score-image, being able to enclose every possible characteristic of the sonic phenomenon it represents, and, subsequently, dictate concretely specified tasks to the performer, as well as perceptual tropes to the listener, is fully at work-very much in resonance with our account of LG method of piano playing. Cox suggests that complex music has brought about a "fundamental paradigm shift" away from that model, because of its purely quantitative characteristics, namely:"[...] extreme degrees of both density and fine detail, and [...] coalescence of highly rationalized materials, notated challenges and organization with an extreme physicality and almost irrationality of results" (2002:70).The paradigm shift consists in the transformation of the above mentioned communicative chain into "[...] an overlapping series of volatile conflicts between incompatibles. Thus, notation is treated

as an essentially opaque medium, (to paraphrase Derrida, notation is always already "writing", with all its historical sedimentations) and such notation demands less reading than decipherment" (2002:76).

Cox's response to this perceived shift is twofold and highly characteristic of the aporias surrounding contemporary performance practice at the moment: On one hand, he suggests three major revisions of the hmpp: he acknowledges the legitimacy of a properly interpretational level independent of the purely technical skill in the performance of radical complex music (2002:102), and the perception of performance as part of a project of responsible translation between the incompatibles of the communicative chain (2002:103), asking for the substitution of the concept of an absolute performative solution with one of varying degrees of tension and resolution (2002:106-107). But on the other hand, his practical suggestions reveal an actual re-tuning into the hmpp task-oriented perception: tasks and challenges of an even higher order, requiring equally heightened abilities and training according to the traditional standards of the hmpp, are outlined as the necessary (and morally reassuring against accusations of "fakery") counterpart to his previous ideas. (2002:103, 109-118). To our mind, this acknowledgement of a vague, not physically-based "interpretational level", to be followed by the absolutist management of tasks and challenges, is a return of the traditional Technique/ Interpretation dichotomy, and thus, in practical terms, contradictory to the claimed paradigm shift. Moreover, it still adheres to a highly internalized and quasi-biological super-human development concept. The difficult tasks have to be patiently tackled with intelligence and moral power of will, as has ever been the case. As for the body, its role is clearly subservient: it has to tune into a model and burn it into muscular memory. The fundamentally Cartesian idea of a mind in absolute control of its storage system and tool is here fully at work.

The concluding part of Cox's article, though, does bring fresh considerations as to the role of corporeality itself. In the beginning of this last section, Cox acknowledges that the sets of tasks he has actually dealt with thus far are corresponding to their traditional equivalents (2002:118) and sets off to define those which distinctly break into new territory. Their novelty is defined as such: "They can almost certainly provide no useful 'sound-image', because many of the [score] indications specify not specific types of sounds towards which coordinated physical movements are oriented, but rather different types of independently-organized physical movement whose sonic outcome is the result of their interaction." (2002:122-123). The treatment of these elements as distinct parametrical strata in the compositional and notational practice of figures such as F. Cox, K. Hübler, W. Hoban, A. Cassidy and others, yields very challenging and finely differentiated, still sonically unstable and unpredictable results. The major point for Cox- and for us- is that this conception "open[s] the possibility of a new sort of 'corporeal' thinking transcending means/ends oriented training (for example, of traditional virtuosity) [...] and value[s] that which is so consistently denigrated in Western philosophy-the physical body and physical motion- without fetishizing the physical domains in expense of the mental/ideal (2002:129). He goes even further as to suggest that "A fitting thought-experiment would be that of treating human bodies and physical motion as though they were potentially self-conscious." (2002:129). With this last proposition, not only does the physical body enter the score-representation as a legitimate compositional factor, but also its ambivalent ontological position in relation to consciousness turns into a theme of compositional reflection.

Environmentalist applications in complex piano music

Cox's last views on the ways corporeality is highlighted in this recent corpus of works, characterized as "New Complexity", will serve as our starting point for a reflective synthesis of prior ideas on piano playing, environmentalism, and the specifics of postwar piano repertoire, in search of a proper interface, which enables the performer to plug into the score and engage with the work. Both considerations of efficiency, in the sense of the least possible expenditure of energy in the learning process, as well as an active challenging of the concept of the pianist as an autistic entity involved in a perpetual inner development of skills, in order to tackle tasks and challenges, will be here at work.

We would wish to extend the field of application for these ideas to a broader surface of postwar repertoire. Next to the explicitly complex works of radical complexist repertoire (such as Ferneyhough, Finissy, Barrett, Mahnkopff etc), this would come to include serial and post-

serial (Boulez, Stockhausen, Babbit, Carter..), textural (Xenakis, Ligeti, Furrer, Sciarrino...), aleatoric (Cage) work, as well as some of Helmut Lachenmann's work ("musique concrète instrumentale"). The common denominator here is the "notational explosion" characterized by density and detail at the same time, rationalization of materials and extreme physicality, along Cox's earlier description. The mental image of the music as an (actually, the only available) entry point to learning is essentially resisting the clear visual perception it could enjoy in earlier repertoire; the eye is overloaded and the mind obscured, through a maximally fragmented surface. To remember an influential metaphor from before, the LG "photography", in its sharpest possible rendition (the score), already equals a blur! But next to that characteristic, we should add another, more paradoxical, one: The body is the locus where two extremes of complex repertoire meet: the *intentionally disembodied score* requiring an active and urgent participation on the part of the performer (expressive impossibility, unpianistic scores, even bad notational practices fall into this category) meets scores where corporeality is highlighted through the ways described before (parametrical writing, de-coupling, unconventional gesture etc.)- we can call it the *embodied score*. In both cases, the role of the performer is exceeding the traditional "service to the composer's conception" concept and is assuming an interpretative autonomy qualitatively different from traditional notions of textual interpretation.

The alienation of the notated image is heightened by the fact that, most often than not, the musical ideas themselves cannot be plugged into any sort of directly discernible musical structure influenced by the linguistic formal models of the "common practice" past, discouraging any purely traditional analytic approach to it. To bring a notable example, in approaching much of early modern work, such as Schoenberg's *Klavierstücke op.11*, the pianist could at least rely on a design of phrases and form coming directly from Brahms and relieve the defamiliarizing effect of atonality; but in dealing with Xenakis and constellations of signs on paper forming sonic "clouds" and "galaxies", neither tradition can help, nor an engagement with the highly abstract pre-compositional mathematic material, through traditional analysis.

Since the mind and the eye are so notoriously short-circuited in the repertoire at question, it must be quite clear by now that the LG approach to mental representation is heavily inadequate for the purpose of triggering the learning process -unless we want to consider only individuals with phenomenal memory skills as able to be engaged in performing complex music. And the same applies to a hmpp approach stressing the need for polishing the smallest bits of notational information in sound and aiming at a maximization of textual accuracy from the very beginning: an impossible project, essentially to be taken up by humans with a quasi-infinite life span (even if this could be the case, the notoriously cruel time limitations on the learning process imposed by the professional requirements in the New Music scene would bring such non-existent individuals to a disadvantageous position).

In this potentially very annoying situation, an environmentalist-informed approach focusing on corporeality can come in very (literally) handy. We have already examined, in the first section of this paper, such a model: Sandor's code for translating directly visual patterns on the score into the performer's domain: motion patterns. To be able to apply such a typology, developed out of consideration of mainstream classical piano repertoire, to the complex repertoire in question, we need to see how do these parameters change in the complex notational surfaces and in their actual translation in motion. One first point of departure is that the often non-linear, highly fragmented and multi-layered nature of the material (especially in complex polyphony, textural and aleatoric composition) short-circuits the immediacy of a basic, binary piano reflex Sandor's account takes almost always for granted: hand distribution. It is not accidental at all that the very first sentence in the preface to the latest Ferneyhough solo piano piece, *Opus Contra Naturam*, addresses exactly this issue: "Due to the constant changing of clefs and registers, the distribution of materials between the staves of the score is *not* intended as a guide to their assignment to left or right hands in performance. Each pianist will determine this aspect of the interpretation individually"(2000, p. [ii])

While such an approach could certainly be deemed commonsensical for any piano composition with rapid clef- and register-changes, it does indicate the fundamental challenge of realizing a complex, non-linear massive polyphony of overlapping gestures by tapping into a human structure: the 2 hands. One should also take into consideration another environmental datum

here: individual hand span, which has to accommodate music material dispersed all over the keyboard. These two factors, hand distribution and hand span, become crucial then for our manipulation of the score in making the physical gesture trajectories visible and graspable.

Before codifying actual practical applications of this concept, let us revisit Rowlands' model of information retrieval. In *The body in mind*, chapter 6, he presents us with four basic principles for the environmentalist view of memory (M1 to M4 will be the abbreviation, used also by the author himself): M3 and M4 are essentially applications of the epistemological and ontological claims respectively (mentioned earlier in the paper), on memory. That is, an organism can process information through manipulation of physical structures (epistemological claim) and manipulation of these structures is a sort of information processing (ontological claim) (1999:122-123). M1 has also already been dealt with in this paper in the definition of the manipulative thesis as a basic principle towards maximization of efficiency: the amount of information we process internally is inversely proportional to the amount of information processed through manipulation of external structures. The principle which we consider enlightening for our own account is M2: "In performing a memory task T, we cannot begin to understand the internal information processing task facing an organism unless we understand what relevant information is available to the organism in the physical structures around it" (1999:122). Subsequently, if the pianist wishes to plug into the information contained in the Sandor environmental schema, she has first to understand the amount of corporeal information available to her in the score. We suggest that this equals a translation of the score in hand distributions and hand/finger grasps- in other words, in appropriately *purely corporeal gestural units*- and its potential codification as an out-of-time layer which "cuts through the textual complexity" (Stefanou-Antoniadis, 2009:5). This layer is produced actively during the performer's first *scannings* of the score -always employing her environmental structures, the instrument and the body, and interweaving them in this sort of *gestural ground*. This ground can manifest as a performative score, (or a mapping of the existent score if this serves clarity and energy saving), and can be used as an external structure. Then one can actually plug into that using the Sandor code, given the necessary adjustments implied by the repertoire in question (gestures need in general to adjust to the extremities of the writing with very specific ways which we don't have the time to analyze here). The actual translation of the score in motion, transforms then in two simple pattern-mapping operations (mapping a trajectory on the score and mapping the code on it), according to the relevant Rowlands' ideas discussed before.

One could even suggest the use of multiple scores: in my practice of *Opus Contra Naturam I* I am using two of them, the *corporeal* score addressing the out-of-time layer discussed above, and a second one dedicated to complex rhythm decipherment. In the latter, mapping is again crucial in dealing with the information overload in an anti-overwhelming way: a top-down approach to rhythm *sculpting*, involving steps of increasing complexity (from 2-bar tempo based units down to meters, beats, simple relationships to the beat, more complex relationships, nested tuplets etc) mapped on each other, becomes visible on the score, in a form which allows direct access and execution, instead of an anxious internalization. The main point of divergence from F. Cox's discussions focused on complex rhythm should be clear already: rhythm is rather treated as the organic and perpetually refineable rhythmicization of the gestural out-of-time layer, rather than as a quasi-impossibly composed and articulated fixed quantity to be perfectly reproduced by the player. Even more importantly, the notions of Technique and Interpretation are not artificially separated and serially arranged, but rather substituted by the notion of a *thinking and perpetually refineable physical gesture*.

A corporeally and environmentally focused discussion of the repertoire in question would be crudely incomplete if neglecting to address the question of actual performative difficulty employed for compositional and expressive purposes. In our extension of the Sandor code through a score manipulation based on clarity of gestural trajectories, we silently assumed that those trajectories are tailored on the whole idea of an efficient, energy-saving use of the body which acknowledges the role of gravity and its own physiology. We wish, though, to utter a word of caution as to the potential danger of smoothening the edges, especially in the case of the extreme repertoire in question, that such an approach in learning might entail. Composers are often deciding *contra naturam*, and for good reasons!

In the first chapter of his book *Piano notes*, Charles Rosen cites a famous example of such a case from the mainstream repertoire: the opening left-hand leap in Beethoven's *Hammerklavier* Sonata: "Many play it with two hands, but this clearly ruins Beethoven's effect. Played as the composer wrote it, it both sounds and looks like a grand and daring leap, and the sense of courage and excitement is communicated aurally and visually. Played with two hands it looks easy, and is easy-and consequently it sounds easy as well" (Rosen, 2002:22). This is a very good example of how the performer's gestural vocabulary should always be calibrated by a contextual understanding of the spirit and the global and local expressive content of the work. In the complex repertoire under question, one of the most persistent features has been the development of the musical language towards the direction of radical defamiliarization with idioms of the past. Ian Pace has repeatedly shown how deviations from mainstream schools of piano playing-authoritatively reproduced in institutionalized musical education- (such as employment of keynoise as opposed to a "close to the key" approach and other unconventional modes of attack or release, stratification of layers of information and rubato issues), can project different degrees of continuity-discontinuity through corporeal means (Pace,2008:13). The issue becomes central in recent compositional activity which considers performative physicality and choreography as morphological determinants. One of the main figures working towards this direction, Aaron Cassidy, states;"[...] the primary morphological unit [...] is not merely the aural gesture ,but far more importantly, the physical gesture.I would assert that the shapes and local forms that we hear and process as listeners are at their core the byproducts of physical, visceral activities and energies, and, further, that the physical motion required to create a particular sound or sets of sounds is the most important component of a gesture's morphological identity" (Cassidy,2004:34). Decoupling and stratification of physical motion, as discussed before in the contexts of Cox's insights, as well as purposeful employment of unconventional uses of the body for the production of often unstable sound results are only some of the relevant developments. We would dare say that these ideas, next to their defamiliarizing effect, bear also an unexpectedly fresh result: the direct re-inscription of the performative body in the centre of compositional interests and the composer's re-familiarization with the primordial musical sources. Isn't that in itself an environmentalist project in composition?

Conclusion

If Foucault is right in saying that:

"Our erstwhile animal bodies were utterly destroyed by history. History and language seem utterly to determine what we will perceive, what we will distinguish as touched, seen, or heard" (1977:148)

then the recent developments suggested above might actually show that history can also restore them. Complex piano music provides an exciting platform for the re-introduction of corporeality in the center of the performer's activities, without at the same time fetishizing it: The acknowledgement of the importance of the physical gesture is never meant as a priority of Technique over Interpretation, but rather the appreciation of an urgent need to transcend this divide, enabling a direct translation of all traditional interpretational elements into gestural, thus performer-specific, ones. The development of a new sort of musical intelligence, not as a mystified ability of geniuses or heroes to tackle tasks, but rather as a perpetually refineable skill of navigation between the environmental structures mentioned above, might have obvious educational implications. But let us stay here in the fact that this approach could refresh the composer-performer relationship and bring new insights to the debate about the ontological status of complex notated music.

We hope that during the course of this paper it has become clear that the unification of the musician's creative forces, body and mind, might actually be passing through the active acknowledgement of their distinct characteristics, their separation; what can unite them, by removing privilege over one or the other, is the appreciation and perpetual exploration of their common interactive nature as parts of an environment, which is both physical and cultural.

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