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***Studying recordings of performances,
capturing the musical experience of the analyst***

Warning: This is the text of my oral presentation, not a publication.

(If it nevertheless looks like a readable text, it is due to the extremely efficient work of Jonathan Goldman (Montréal) who first translated it from French. I would like to express my gratitude to him.)

Examples are indexed as follows **{url of the illustration, or at least a description of it if the illustration cannot be found on the internet}**.

Parts of the paper were taken from articles already available in French-speaking journals, which are listed at the end of this document. An English-rewritten version of this paper may appear in 2008.

I will be dealing principally with the *musical experience* of the analyst of performance, and in particular with the *problematic* nature of its transmission to others (i.e. the readers and listeners of his publications). Given the crucial importance of the individual and collective *auditory culture* of musicologists in their daily work, this theme can not only be considered as an epistemological issue; it is above all one of method, which comes into play in the *genesis* of analytical facts (notably through the use of new specific software) as well as in their *public exposition* (in particular through the use of renewed conventions in musicological writing).

1. Prologue: a practice of phonographic listening oriented towards research

I'd like to begin with a reference to ethnomusicology, that branch of musicology which saw a period of full effervescence at the beginning of the twentieth century, and which, like performance analysis today, defined itself notably through the study of recordings. On this subject, Béla Bartók had the following to say in the essay "Mechanical music" from 1938:

The science of folklore is a relatively recent one; its tasks, aim, and viewpoints of examination change and, as it were, expand from year to year. Newer viewpoints arise, so that the material has to be re-examined—sometimes along lines of which we had previously been unaware. With recordings, we can fill in the gaps; without them we would be absolutely helpless if a later revision should become necessary.¹

Bartók thus emphasizes both that phonograms are the most reliable archive for the ethnomusicologist, and that the encoding of melodies into musical notation is necessarily the result of a scientific project and of a historically situated auditory capacity which can evolve through time.

This point is strikingly illustrated in another of Bartók's essays from the same period, entitled "The So-called Bulgarian Rhythm"². A passage of this well-known essay refers to the failure of orchestral musicians to internalize asymmetrical rhythms. He explains that during a lecture on peasant music, high calibre

¹ Béla Bartók, *Essays* (B. Suchoff, ed.), London, Faber & Faber, p. 294.

² *Ibid*, p. 40-49.

musicians from the Frankfurt Radio Orchestra were asked to perform the musical examples, and in particular this simple dance theme in 5/8 time **{see Bartók's *Essays*, p. 42}**. Bartók writes that "even after many rehearsals they could hardly play this melody: they always wanted to transform it into 6/8 time"³. But at this point, Bartók displays his own fallibility in a parenthetical remark when he adds:

(Some years later, when revising the notation, I noticed that I had transcribed the recording in a faulty rhythm. This is how it should be: **{see the second figure, same page as previously}**. What would have happened had those musicians been faced with the dance tune in this form?⁴

As a direct illustration of the preceding methodological point, this anecdote suggests that what forces us to go back to the phonograms is not only these "newer viewpoints", but also the fact that repeated listening to the phonograms gives rise to new ways of listening to them. Between the first and the second transcription, there is a reiteration of the listening experience, but also possibly a refinement of Bartók's ear, in as much as it is of a pair with the mechanical prostheses which are ever better adjusted to his listening practices (we need only think for example of the practice of slowing down of the rotation of the turntable, which allows for listening to melodies at half the speed and an octave lower). Finally, it is worth noting that the means of "adjustment" are not only the phonograph and the phonograms, but also the traces of listening which take the form of transcriptions: in effect, Bartók takes the insufficiencies of the first notation as a starting point for the writing of the second one.

It is not difficult to make a parallel between this and the questions which preoccupy us in 2007. As users, and sometimes as designers, of the high-performance "phonographs" of today, we must not only produce new forms of transliterations, of graphs, and other representations of our data, but also, as Bartók shows us the way in certain texts, we must beware of a form of technological positivism which consists in separating the *empirical measures of performance* from their *inscription in the individual dynamics* of a scientific investigation and a listening practice. And, to extend this idea, the *restitution of the results* of an analysis should take into account the fact that the receiver will need, in order to understand them, a *means of appropriation*: for example, not only to have access to the recordings which are being commented, but also to a kind of listening guide which highlights those aspects under consideration, or even, when possible, the analytical tools employed by the author.

I will illustrate these points through a series of examples culled from research undertaken since 2003 by the team 'Analysis of Musical Practices' (APM) at IRCAM⁵.

It is important to note that we are a musicology research group, and not an IT team, contrary to our other IRCAM colleagues; as a result, my presentation will deal with problems of method from the point of view of the musicologist, even when it touches on so-called "computer solutions".

³ Ibid., p. 42.

⁴ Ibid., p. 146.

⁵ See www.ircam.fr/apm.html for a yearly-updated presentation of the team and accounts of projects in progress.

2. Visual guides for configuring listening: the example of score/performance annotation

I completed a performance analysis of Ravel's *Noctuelles* performed by postwar French pianist Samson François (1924-1970), which took the form of a multimedia online article {cf. <http://demeter.revue.univ-lille3.fr/interpretation/donin/web/doninweb.html> or download the multimedia article (see last page of this doc)} : in the right hand column, Ravel's score can be consulted while listening to the recording of Samson François ; in the left hand column, you can access the different 'pages' (or 'sections') of the article, which contain hypermedia links to certain places in the score, for example: {cf. **section 1: annotation readable by clicking on the word "malgré"**}.

The main idea of this article was that it could be interesting to consider a classical music recording as a *trace of the activity of reading* [in French, "*lecture*"] rather than as an *interpretation of a text*. This claim avoids certain a priori assumptions, such as:

- First, it avoids the *a priori semanticisation* of musical texts. The execution of a script in a public performance situation is not necessarily comparable to the learned and consistent exegesis of a web of meanings.⁶
- Second, it can be helpful in avoiding the *a priori* postulate that the *work* is a relevant unit of size for the performer: we emphasize rather the *activity* which could focus on a heterogeneous collection of musical texts, over the time-scale of the preparation of a concert, or of a day of work, or on a type of repertoire.
- Finally, and this is the central point of the 'Samson François/*Noctuelles*' article, the emphasis on reading avoids treating performance as a *deviation* of greater or lesser magnitude with respect to a supposedly autonomous text which functions as a standard; in this way, the non-respect of indications in the score is not necessarily a crime of interpretive treason, and occasional errors of execution are not necessarily musical waste: these phenomena are part and parcel of a singular practice of reading, no more and no less than phenomena which are compatible with the musical text. The most perceptible deviations are only the most striking hints of the performer's reading activity which is nevertheless just as present in the passages which contain no divergences from the text.

When I began work on Samson François' version of *Noctuelles*, I started by cataloguing some facts which were apparent to my ear (without knowing whether significant they would be as traces of his reading of the piece) such as:

- The misread clef (treble instead of bass) in the left hand {**listen to p. 6 of the score, systems 2 & 3**} : the musician plays an F- in the middle register instead of an A-flat in the low register; also:
- The passages in which he wavers between respect and non-respect of the verbal indications {**section 1: annotation "Par exemple"**}
- The passages in which he continually plays a C-flat instead of a C-natural. {cf. **section 3, annotations "Ainsi", "(par exemple p. 7)", "ce passage"...**}

⁶ This point has since been investigated through a study of the activity of reading by conductor Pierre-André Valade—see a web reference in the last page.

Although these facts were obvious to me, I had to admit that some of my colleagues did not always notice them, even when I verbally described them before or after listening to the passage. What could be the reason for this? It could have been because they weren't themselves familiar with the work, so they were not able to make an implicit comparison with a literally exact model. But even those who *were* familiar with the work needed to listen more than once in order to identify and to stabilize the aspect of the recording to which I was trying to turn their attention.

Consequently, in order to make reference to these aspects of the recording, it was not enough to present someone with the score, the sound file and my commentaries: it was necessary to "configure" the listening and the reading with *indexicals* (which are if possible consistent with musical notation) such as for example the red circles around the incorrect C-flats in the preceding example. Here are some other examples of indexicals which serve the purpose of indicating the singular form of attentive listening required:

- In this example, the pianist consistently begins the arpeggiated figuration with an E-flat instead of a C **{section 7, annotation at "par analogie"}**: the annotation offers an explanation in suggesting that Samson François was drawing a motivic analogy between the right and the left hands.
- Here, a strong rhythmic inflection **{section 5, annotation at "groupe de croches"}**
- At times, different layers of annotation are necessary in order to decompose a problem. For example, concerning the strong *rubato* in the passage which we just looked at, I suggested an explanation which takes into account a contradiction in the musical text itself: the bar is notated in 5/8 time, which is incorrect (it is actually in 6/8 **{section 5, annotation at "s'expliquer en partie"}**) ; the pianist finds in his reading of it an elegant solution to this contradiction, or rather, a way of defusing the problem: **{section 5, annotation at "allongement"}**

All the annotations which I have just shown consist of ways of influencing listening *through the intermediary* of reading. The creation of these annotations began first with rough sketches which, for brevity's sake could be thought to answer the question: which layer of annotations will best capture a given aspect of the recording?

But the analysis of this performance implies also verifications, for example ways of measuring sound which can be summarized in an annotation **{section 1, "graphe"}** ; also, standard sound processing operations like time stretching or compression, frequency analysis, etc., which allow us to study details which are perhaps not accessible when the piece is listened to in the normal manner. For example, the nature of the acceleration which follows the clef-reading error which I indicated earlier: **{section 4, "écoute au ralenti"}** ; judging from our listening to the slowed-down version, the sudden acceleration corresponds exactly to a semiquaver triplet, and I hear the suspension of the last note of the bar as a quaver **{section 4, "plusieurs divisions du temps"}**.

It goes without saying that as soon as the reader of this type of analysis is aided by relevant annotations, he becomes capable of perceiving phenomena which he would probably never have been able to discern by himself, even after dozens of

hearings. In fact, this is true first and foremost for the author himself. Over the course of my work on the analysis and also during its preparation into multimedia form, I began to hear new aspects of Samson François's 'reading' that I was incapable of hearing previously. In other words, the tools which assisted me in describing and in transmitting my listening, also irremediably provoked its transformation.

3. The adjustment between the analyst and his tools: The example of the comparison of recordings based on variations in durations

In order to look more closely at this question of interaction between the analyst and his/her tool-kit, I will be referring to examples which concern not so much the way they are *given shape*—the transmission of analytical facts—as the *procedures* involved in their fabrication, that is, the analyst's *workshop*.

My examples come out of a collaborative design project for the "Bachothèque", a prototype for a tool which compares recordings of the ubiquitous First prelude of the Well-Tempered Clavier. The tool's development was undertaken between 2003 and 2004 by my colleague Samuel Goldszmidt, a multimedia engineer, in collaboration with another team at IRCAM, called "Analyse & synthèse des sons" (analysis and synthesis of sound), headed by Xavier Rodet, which developed an algorithm of alignment which allows for the comparison of different audio files with their shared MIDI referent. As far as the algorithm itself is concerned, this tool is—fortunately!—obsolete today, and I therefore won't discuss this aspect of the tool. My discussion will deal rather with the *interface*: some of the reasons behind it and of its possible uses by an analyst. To this end, I will be mostly relying on screen-shots.

We begin with the main interface of navigation and comparison between recordings {<http://recherche.ircam.fr/equipes/apm/images/EX3.jpg>}. It displays different recordings which have been aligned with the MIDI file; the MIDI file is represented in two ways: MIDI score and piano-roll. The different sound files can be displayed in seconds (in that case they appear with unequal lengths), or else in notes (in which case they all have approximately the same length as the piano-roll). It is possible to control the number of versions visible on screen, to horizontally expand or contract each of the lines separately, and to select groups of notes or measures in all of the recordings at the same time, by acting on the MIDI referents. For a given passage in a given sound file, the timing of the attacks can be visualised through a kind of zooming in to the scale of notes {<http://recherche.ircam.fr/equipes/apm/images/EX6.jpg>}, by using at once *contrasting colours* (the darkest blocks corresponds to the shortest durations), *the length of the blocks* (the lengths are proportional to the durations) and a *graph of durational variations*. One and the same information about timing is thus represented in intentionally redundant ways, in order to facilitate one of the essential practices targeted by this interface: comparative, attentive and repeated listening to sound fragments, assisted by a graphic representation of their distinct parameters. Here is an animated sequence, taken from the Bachothèque, which although reductive, is nevertheless representative of the way this program displays the zoom:

{http://www.ircam.fr/fileadmin/referentiel/domaines/apm-maquettes/maquette_bachotheque.swf} (In passing, I would note that we see clearly that this interface is predicated on a particular musicological project: for example, this representation in triplicate, with effects of black and white

contrast, greatly facilitates the apprehension of phenomena such as 'compensating rubato', whereas it necessarily masks other phenomena.)

The possibility of being able to change scale turned out to be essential—for example, the choice of navigating in a synoptic view of all eight versions and then to pass, for a selection of two or three of them, to a comparative zoom of a single measure. In general, having several different visualisation modes for the same timing data seemed to me to be a *sine qua non* for familiarisation with a given corpus of recordings. For example, I spent considerable time trying to put into words a temporal phenomenon which caught my attention when I compared the first measures of Glenn Gould's version with Edwin Fischer's. Even when I varied the number of notes considered, and after many intensive listening sessions, it was unfortunately impossible to identify any sort of significant regularity or irregularity amidst the fog. It turned out that I had simply not perceived that Fischer continuously accelerated his tempo for the first six measures, while the tempo was stable in Gould's version. This seemingly obvious observation was no longer visible from the microscopic viewpoint which I had chosen, especially since information about the "durations between the attacks" took on two completely different meanings in Fischer's playing style (*legato* with use of pedal and local variations of dynamics) and in Gould's (stable and *détaché*). In order to become conscious on the one hand of this obstacle to comparison, and on the other, of the phenomenon of Fischer's acceleration, it was necessary to *change the scale* of the view, and to consult the graph of average tempi per measure

{<http://recherche.ircam.fr/equipes/apm/images/EX7.jpg>} for each of the recordings.

Another example : calculating the average tempo on a measure by measure basis {<http://recherche.ircam.fr/equipes/apm/images/EX5a.jpg>} reveals the global similarity between Gould 1963 and Walcha 1961 : the curves are often indistinguishable, the slight decrease in tempo between measures fourteen and twenty is barely more marked in Gould than in Walcha, etc. However, if we calculate the average which bears only on the tempo of the first two notes of each measure on the one hand, and of the last notes on the other, {<http://recherche.ircam.fr/equipes/apm/images/EX5b.jpg>}, we find a high degree of internal variation in each of these versions. Gould's version consistently makes use of a contrast between a slower-than-average *beginning* of each measure and a faster-than-average *end*, while this difference is less pronounced in Walcha; the absence, or even the inversion, of this difference is not necessarily produced at the same places in each of the versions. The two representations are based on the same values and yet neither is more true or more complete than the other: the first could be used in a passage of an article in which the writer was trying to emphasize the stability of the tempo in each interpretation, as well as their similarity in terms of global duration; the second could be used to describe the subtle internal dynamics created, maintained and modified over the course of a few seconds by each of the musicians.

As simplified as these user-testimonies may be, they allow us to point out several more general characteristics of listening practices tied to performance analysis assisted by computer; notably:

- The ergonomics of the interface either favours, neutralises, or masks certain properties of the music which are manipulated and perceived through it;

- The redundancy of information across more than one mode of representation is not necessarily a problem, since it allows for a multiplicity of views of the objects under consideration;
- Moreover, the availability of different scales of visualisation is necessary, as long as it gives pride of place to scales which are relevant to the analytical project being considered (in our example, the relevant scales were: the note, the grouping of measures, and the bird's eye view);
- It is possible that new analytical facts could emerge only *after* having been the object of a musical intuition occurring during the use of the system (like in the last example, in which I was sure that there was something worth comparing in the two passages, but I didn't know what it was, nor was I able to clearly designate the problem);
- Comparative listening is a process of differentiation: one "finding" must be understood with respect to previous findings; the analyst needs some means to trace back his/her thoughts (this is the reason why we developed facilities of annotation and of saving states of the system).

In order to offer a counterpoint to this list, I would like to finish by giving a brief historical example which shows what happens when neither the scientific project, nor the method of data collection take into consideration the analysts' involvement through their listening. In what is to my knowledge one of the first explicit applications of experimental method to the study of performance, Alvin and Prieur⁷ took chronometric measurements of different public performances of Beethoven and Wagner in the early eighteen-nineties⁸ {cf. **chart in Alvin & Prieur, p. 72-73**}. Their premise was (according to the Wagnerian doctrine) that "good movements [=tempi] is a necessary condition of a good performance"⁹. The "comparative measurings" are supposed to "lead to a serious, documented and probing analysis of performances" and "to precisely explain the impressions of the listener". However, the "moral" of their story, or rather their study, is somewhat disappointing, i.e. that "correct movement [tempo], although so necessary, did without doubt not occupy the crucial place among the preoccupations of performers which it deserved" (p. 285)...

4. Articulating the experimental and the experiential

Through the preceding points, performance analysis no long appears as a simple verbalization of a personal way of listening to a recording of a musical work, nor as an objectification of this recording which follows an experimental method. Rather, it consists precisely of the *articulation* of both of these registers, the *experimental* and the *experiential*.

I qualify as *experimental* a technical or technological apparatus which allows one to isolate supposedly reproducible natural phenomena. In the case of the 'Bachothèque', it consisted of a computer tool for the comparison of different sound recordings of the same work.

I qualify human cognition as *experiential* inasmuch as it is derived from the experience of the senses, is particular to a finite consciousness, localised in time and space and strictly speaking impossible to reproduce. If we think of the

⁷ H. Alvin & R. Prieur, *Métronomie expérimentale. Paris – Bayreuth – Munich. Étude sur les mouvements constatés dans quelques exécutions musicales en France et en Allemagne précédée d'une lettre de M. Hermann Levi*, Paris, Fischbacher, 1895.

⁸ Cf p. 24-25.

⁹ p. 282

preceding example, it expresses a *lived* musical experience through an experimental apparatus that is the hearing of the different versions made comparable through it, as well as the judgments made about the differences calculated by the algorithm and made visible through the interface.

On the basis of these definitions, the articulation between the experimental and the experiential is necessarily an evolving one—it follows a process of adjustment between the analyst and his computer-prostheses (or, more generally, his analytical techniques). It is in this sense that over the last number of years at IRCAM, we have been approaching analysis as a special case of what we call “signed listening”, defined as a singular manner of listening, which can not only be made explicit, but can also be shared with others through the use of appropriate techniques and technologies. (In this respect, the listening practice which I have described from the ‘Bachothèque’ is only a special case—learned and computer-aided—of listening practices found ‘in the wild’, i.e. those adopted by music lovers who compare different versions on disk of one and the same loved work, giving great attention to details.)

If we now translate the preceding propositions into scientific rhetoric, this means that the results of analytical processes should be exhibited as both facts verifiable in the recording, and as particular points of view of a specific listener attained through a process of appropriation. These «analytical facts» could clearly be formulated without any reference to the process, but they would risk being unintelligible, since they would not in fact be significant with respect to an evolving referent, the analyst’s listening. On the contrary, it would be inconceivable to replace a structured exposé of analytical facts by an account of personal experience, the analytical equivalent of the notebooks accumulated during an ethnographer’s fieldwork. In that case, analysis would no doubt stop prematurely at the “pre-analytic” stage, to borrow a term from a remarkable article by Kofi Agawu, published 18 years ago in *Music Analysis* and entitled “Schenkerian Notation in Theory and Practice”. Agawu writes:

[T]he extensive printing of graphs in our journals may well be a sign that all is not right. Are not many of the graphs we use pre-analytical (representing the genesis of the analyst’s efforts) rather than analytical (presenting the actual conclusions arising from the analysis)? Except in the case of didactic works, such printing of long samples of hierarchical notation with no specific conclusions arising out of the effort seems to me to blur the dividing line between tautological demonstrations and exhaustive ones.¹⁰

Unlike Agawu in 1989, we hope to have at our disposal in some not-too-distant future, multimedia publication software in which not only would the results be accessible, but also the steps and the operators which led *to* those results. The ‘plus-value’ of musical analysis will then manifest itself.

If, as I suggest, we wish to better integrate into the writing of analysis the fact that the results presented are the culmination of a particular listening practice, then we must bring together as much as possible *technologies of publication* with the *analytical technologies* themselves. This is what we are now trying to do at IRCAM through the publication of educational multimedia analyses whose tools and materials are supplied to the readers/listeners at the same time as the

¹⁰ Kofi Agawu, « Schenkerian Notation in Theory and Practice », *Music Analysis*, vol. 8, n° 3, 1989, p. 295.

analysis¹¹. This is done in such a way that readers can assimilate the analysis by redoing it themselves, allowing them also to extend, to modify or to contradict the analysis proposed (...or just simply to forget about it altogether, and to use the tools on a different corpus of interest to them).

This type of internal consistency between technologies of publication and technologies of analysis existed—and still exists, but we have become unaware of it—i.e. the fact that music analysis almost always takes place on *paper*: it is interested in ‘works’ which take the form of scores, and gives pride of place to the relationship between reading and writing, assumed to take precedent over listening and performance. Going back to the study of recordings, we need to invent new conventions of writing and reading which will supply us, as analysts, with a new form of reflexivity about our own musical experience. In this sense, the problems of method forcefully posed by the analysis of recordings are no doubt similar, but in concentrated form, to those faced by music analysis and empirical musicology generally.

Some paper- and online resources linked to my presentation

- 1) The Samson François/*Noctuelles* analysis can be downloaded here:
<http://www.univ-lille3.fr/revues/demeter/> then select ‘Articles en ligne’ then select ‘Interprétation’ (then choose the Mac or PC version)
 It can also be consulted directly online here:
<http://demeter.revue.univ-lille3.fr/interpretation/donin/web/doninweb.html>
- 2) The notion of *lecture* (“reading”) has since been applied, in a more ethnographic way, to the activity of a conductor, from the preparation of the performance to the rehearsals. This led, among others, to the following online publication: N. Donin & Jacques Theureau, “L’interprétation comme lecture? L’exemple des annotations et commentaires d’une partition par Pierre-André Valade”, *Musimédiane* [<http://www.musimediane.com>], n° 2, automne 2006.
 Direct link: <http://www.musimediane.com/numero2/Donin/introduction.html>
- 3) The results of the “Bachothèque” project are published in a French journal of music analysis: N. Donin, “Problèmes d’analyse de l’interprétation. Un essai de comparaison assistée par ordinateur d’enregistrements du premier prélude du *Clavier bien tempéré*”, *Musurgia. Analyse et Pratique Musicales*, XII/4 (2005), p. 19-43
 The illustrations of that article (from which most illustrations of my powerpoint were drawn) are accessible at
http://recherche.ircam.fr/equipes/apm/ill_musurgia.html
- 4) The “signed listening” project had first been presented in English: N. Donin, “Towards Organised Listening: Some Aspects of the ‘Signed Listening’ Project, Ircam”, *Organised Sound*, n° 9(1), 2004, p. 99-108.
 An online presentation of each sub-project (notably the ‘Bachothèque’) can be found on the webpages of my research group: go to www.ircam.fr/apm.html then select ‘Pratiques contemporaines d’écoute et d’analyse’
 A partial update of the project has recently been published in a French-language Canadian journal: N. Donin, “Pour une « écoute informée » de la musique contemporaine : quelques travaux récents”, *Circuit, Musiques contemporaines*, vol. 16, n° 3, 2006, p. 51-64.
- 5) The Alvin & Prieur example (1895 study on performance analysis) is drawn from a forthcoming book chapter: Rémy Campos & Nicolas Donin, “La France

¹¹ 2 CD-Rom (*Un parcours interactif dans Voi(rex) de Philippe Leroux* and *Un parcours interactif dans les Variations op. 27 d’Anton Webern*), to appear in May 2007.

wagnérienne et l'analyse musicale. Outils et finalités d'une pratique collective", *Pratiquer l'analyse musicale. Une discipline historique et son histoire* (Campos & Donin, ed.), Genève, Droz-Conservatoire de Genève, to appear in the end of 2007.

Translated by Jonathan Goldman
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