Boulez – Xenakis: Two Converging Musical Heuristics

Prof. Dr. Ricardo Mandolini

Prof., Emeritus from the Lille University, France

ABSTRACT: What is heuristics? The methods of imagination that prepares for invention and discovery, by accepting that all arguments are good if they can succeed in achieving the proposed goals. A principle is deemed to be heuristic, therefore, when it is considered not on the basis of the truth it supports but by the fact that it contributes wholly or partly to the realisation of some project.

In order to compose a work, the creator has a certain number of dominant ideas, which function as pivots or fixed points around which the piece develops. The value of these ideas, which sometimes take the form of theories borrowed from the physical or mathematical sciences, is justified *a posteriori*, by the realisation of the works that emerge from them, and not *a priori*: the experimental or logical truth of what they assert, even if confirmed by experimental reality, is put here in brackets. These principles count as opinions for the composer; they are the heuristic principles of creation.

The aim of this paper is to analyse the principles that operate as the driving force behind the creation of Boulez and Xenakis.

KEY WORDS: Music – Musicology – Aesthetics – Musical Heuristics

PRELUDE

There is a fundamental difference between the composers of the post-World-War-II era and those of the first part of the 20th century. This difference is manifested in the way in which they deal with their tradition: the former accept it, the latter deny it.

The composers of the Vienna School, for example, as we know – and despite all the novelties they introduced into composing in their time – wanted to inscribe their projects in the purest Germanic musical tradition. This is demonstrated by their repeated use of techniques and musical forms from the past. In the same vein, the discussion between Webern and Dallapiccola about Kurt Weill is very instructive:

"Incidentally, the name Kurt Weill comes up. And Webern, who has always spoken in a low voice, suddenly explodes. With a flushed face, he points his index finger at me . . . and asks me a direct question: 'What do you find in such a composer of our great Central European tradition, of that tradition which includes the names (and here he began to list them on his fingers) of Schubert, Brahms, Wolf, Schönberg, Berg, and mine?' "[1]

Far from being rooted in historic tradition, much of the composing in the 1950s inaugurated an art of *tabula rasa*, based on the use of axiomatic principles borrowed from mathematics or physical science.

"This idea [serialism] was not as short-sighted as it first appeared; it had the advantage – yes, an advantage – of eliminating references to the classical forms inherited from tradition, whose contradiction, at best, was perceived as ambiguous as far as the form-system relationship was concerned."[2]

The desire to extricate music from its history was thus accompanied by an appropriation of the scientific, experimental or speculative model. This operation was carried out in a similar way to the selective appropriation of musical materials, characteristic of the traditional notion of composition. As with materials, the systems that was chosen needed no justification. Let us take serial combinatorics or stochastic formulas as examples: the question of why they were used did not even arise, so obvious was the validity

---

[1] « Incidemment tombe le nom de Kurt Weill. Et Webern, qui a toujours parlé à voix basse, explose tout à coup. Le visage rouge, il pointe l'index vers moi... et me pose une question directe : « Que trouvez-vous, chez un tel compositeur, de notre grande tradition d'Europe centrale, de cette tradition qui comprend les noms (et ici il commença à les énumérer sur ses doigts) de Schubert, Brahms, Wolf, Schönberg, Berg, et le mien ? »

Henri-Louis MATTER – *Webern*, Éditions l'Âge de l'Homme, 1981, p. 129-130.

[2] « Cette idée (le sérialisme, N.B.) n'était pas aussi myope qu'elle en a l'air de prime abord ; elle avait l'avantage — quand même, oui, un avantage — d'éliminer les références aux formes classiques héritées de la tradition, dont on avait pu percevoir au plus fort la contradiction, au mieux l'ambiguïté en ce qui concerne les rapports forme-système ».

Pierre BOULEZ – « Le Système et l'idée », in *inHARMONIQUES* nº 1,
Paris, IRCAM/Ch. Bourgois, 1986, p. 87.

of their respective axiomatic to the composers who used them. In reality, these systems were part of the particular heuristics of each creator, and their unique justification was given not by any experimental truth they might carry but by the fact that they served as fuel for the realisation of works.

From this set of mathematical, scientific or philosophical musings that characterised composing in the 1950s, I will try here to analyse and compare two enterprises that have greatly influenced the course of avant-garde music: integral serialism as conceived by Boulez and the stochastic music of Xenakis. I will first try to take a closer look at the contradictions they entail in turn, and then discern their secret convergences.

1. Boulez's heuristics

Boulez based his compositional profile on the Viennese model, in particular on Webern. Like Webern, Boulez sought coherence, and it is from this concern that integral serialism was born, as an extension of the dodecaphonic principle. Webern's coherence

"[…] did not even seem coherent enough to [his] successors, since it was exercised rigorously on only one part of the musical language . . . and the other dimensions of composition flowed from it by a kind of strict automatism or by free will applied with unequal success."[3]

Here it seems to me inescapable to distinguish how Boulez's attitude differs from that of the Viennese. Paradoxically, what Boulez criticises in them constitutes their main quality. Thus the dodecaphonic series was only an objective means of "rationally controlling chromatic complementarity at any given moment";[4] a matrix that acted in sum as a "summary means of coordination"[5] that could not by itself bring out the form of the work. The series of pitches contributed, as one element among others, to the organisation of the form, that was achieved by the inseparable arrangement of all other musical parameters (rhythm, tempi, articulations, dynamics, organisation of voices, instrumentation, etc.). All this was done intuitively and "traditionally". The three Viennese agreed on how they viewed their relationship to free compositional will: once the series had been established, they composed as usual, leaving all the other parameters of the music to the creator's intuition: rhythm, nuances, articulation, tempi, character, etc.

Between structure and form there existed a dialectical breath that Webern defined very well:

"Our series – Schönberg's, Berg's and mine – are mostly the result of an idea that is related to a vision of the work conceived as a whole."[6]

In other words, the serial principle, which had not yet aimed at parametric totality, acted concomitantly with the composer's singular, selective, qualitative choice, and complemented the latter. Structure and form were inherently associated from the very genesis of the work. The work as a whole determined its future and could be defined as the particularisation or overcoming of a musical idea towards its definitive fulfilment:

"[...] this is the Goethean idea of the original plant: the stem is already contained in the root, the leaf in the stem, and the flower, in turn, in the leaf: variations on the same Idea."[7]

Let us now turn to integral serialism. Its original purpose was

"to link […] rhythmic structures to serial structures, through common organisations, including also the other characteristics of the sound: intensity, mode of attack, timbre."[8]

We shall see that the combinatorial matrix was applied to pitches and rhythms without any particular consideration. But an inescapable difficulty arises as soon as the principle is applied to instrumentation:

"One obtains instrumental formations which play a very important role in the structure. It should be noted that these permutations are not automatically obtained, *but that they are chosen for the special qualities they present*, that the starting point of these

---

[3] « […] ne semblait même pas assez cohérente à [ses] successeurs, puisqu'elle ne s'exerçait rigoureusement que sur une partie du langage musical... et que les autres dimensions de la composition en découlaient par une sorte d'automatisme strict ou par le libre arbitre s'appliquant avec plus ou moins de bonheur. »
Pierre BOULEZ – « Le Système et l'idée » *art. cit.*, p. 86.

[4] « […] contrôler à tout instant, de façon rationnelle, la complémentarité chromatique ». *Ibid.,* p. 73.

[5] « […] un sommaire moyen de coordination ». *Ibid.,* p. 74.

[6] Anton WEBERN – *Chemin vers la nouvelle musique*, éd. Jean-Claude Lattès, 1980 pour la traduction française, p. 138-139.

[7] « […] c'est l'idée goethéenne de la plante originelle : la tige est déjà contenue dans la racine, la feuille dans la tige, et la fleur, à son tour, dans la feuille : variations sur une même Idée. » *Ibid.*, p. 134.

[8] « lier (...) les structures rythmiques aux structures sérielles, par des organisations communes, incluant également les autres caractéristiques du son : intensité, mode d'attaque, timbre. »
Pierre BOULEZ – *Relevés d'apprenti*, Chapitre II « Pour une technologie »
(« Éventuellement... »), Paris, Seuil, 1966, p. 152.

endeavours, and the goal they propose, therefore, *is above all the sonic evidence*."[9]

Here we detect a fundamental contradiction. Let us recapitulate: for the sake of coherence, Boulez applied combinatorics as a unifying principle of musical parameters. But the latter were not homogeneous; some allowed for the abstraction of the instruments of production (pitches, durations) and others did not (instrumentation). So, like the good musician that he was, Boulez was forced to make a distinction in relation to the criterion of serial organisation. Thus, some permutations would be obtained automatically and other would be subject to choice; in other words, pure combinatorics on the one hand, and combinatorics linked to "sonic evidence" on the other.

This allows me to state that the principle of serial unification, the postulate from which the whole system emerges, is not systematic but heuristic: it splits into two possibilities that are determined by the heterogeneity of the musical parameters. From this analysis, one could say that serial combinatorics is unrealizable as an objective principle, and that what reason wanted to master absolutely is finally left to the creative imagination. This implies that there are leaks between the two supposedly watertight levels of compositional architecture: *structure* (the pure combinatorial principle) and *form* (the real-time elements of the piece).

Between automatism and subjective choice there is thus an unresolved contradiction, which is expressed in the hesitation between admitting and not admitting the subjectivity in creation:

"[...] from everything that we have written about the discovery of a serial world, *our refusal to describe creation as the sole implementation of these starting structures* also clearly transpires; an assurance acquired in this way could not satisfy us, since it would give the appearance of a conditioned reflex to the act of writing, a gesture then of little more importance than a carefully kept or even meticulously perfected accounting. *Composing cannot take on the appearance of an elegant, even ingenious, distributive economy without condemning itself to inanity and gratuity*."[10]

"What contentment, faced with the uncertainty of choice, to be able to say to oneself that a bundle of prior structures, a network of organisations derived from a single model will, through strictly organised cross-fertilisation, give you the unique, inescapable note, the solution which will eliminate chance, the solution which, by dint of being impersonal, will necessarily be the right one."[11]

2. Xenakis's heuristics
Let us now turn to the analysis of Xenakis. On the one hand there are formulas, graphs, stochastics, Brownian movements and the sieve theory. On the other hand there are the compositions, with their unbridled and sometimes apocalyptic violence of expression. It is clear that, to the ear, it is not obvious that one level can be deduced from the other.

"Those who love Xenakis' music and who do not understand much about equations and diagrams have often suspected him of intervening in a much more intuitive way. This is more or less the version he accredits here by making room for an 'appreciation' which, in the end, consists in making a judgement of taste on what the calculation or the machine gives and in rectifying accordingly, without having to justify it with any formalism."[12]

In other words, there is a kind of interface or adaptation process between the formulas and the pieces – the "bricolage" (hacking) everyone talks about – that will transform the mathematical results into a real aesthetic discourse. But what exactly is this?

"There is a great misunderstanding, which Xenakis himself contributed to: his music was assimilated to a systematisation of transfers of mathematical models to composition; but when you look at the facts, even though there is a sort of constant intellectual

---

[9] « On obtient des formations instrumentales qui jouent dans la structure un rôle très important. Il est à noter que ses permutations ne sont pas automatiquement obtenues, *mais qu'elles sont choisies pour les qualités spéciales qu'elles présentent*, que le point de départ de ces recherches, et le but qu'elles se proposent, donc, *est avant tout l'évidence sonore.* »
<div align="right">Pierre BOULEZ – Relevés d'apprenti, op. cit., p. 172.</div>

[10] « […] de tout ce que nous avons écrit à propos de la découverte d'un monde sériel, transparaît aussi clairement notre refus de décrire la création comme la seule mise en œuvre de ces structures de départ ; une assurance ainsi acquise ne saurait nous satisfaire, qui donnerait l'aspect d'un réflexe conditionné à l'acte d'écrire, geste alors sans guère plus d'importance qu'une comptabilité soigneusement tenue ou même minutieusement mise au point. La composition ne saurait revêtir l'apparence d'une économie distributive élégante, voire ingénieuse, sans se condamner à l'inanité et à la gratuité. »
<div align="right">Pierre BOULEZ – Relevés d'apprenti, op. cit., p. 174.</div>

[11] « Quel contentement, face à l'incertitude du choix, de pouvoir se dire qu'un faisceau de structures préalables, qu'un réseau d'organisations dérivées d'un modèle unique va, par des croisements strictement organisés, vous donner la note unique, inéluctable, la solution qui éliminera le hasard, la solution qui, à force d'être impersonnelle, sera nécessairement la bonne. »
<div align="right">Pierre BOULEZ – « Le Système et l'idée », op.cit., p. 86.</div>

[12] « […] ceux qui aiment la musique de Xenakis et qui ne comprennent pas grand chose aux équations ni aux diagrammes l'ont souvent soupçonné d'intervenir de manière beaucoup plus intuitive. C'est à peu près la version qu'il accrédite ici en faisant place à une "appréciation" qui, *in fine*, consiste à porter un jugement de goût sur ce que donne le calcul ou la machine et à rectifier en conséquence, sans devoir s'en justifier par un quelconque formalisme. »
François DELALANDE – *Il faut être constamment un immigré — Entretiens avec Xenakis*, Bibliothèque de Recherche Musicale, INA – Buchet/Chastel, Pierre Zech éditeur, Paris, 1997, p. 30.

algebraisation, you realise that two thirds, if not four fifths, of his production was 'hand-made'."[13]

"From his training as an engineer, the composer retained a concern for efficiency: the theory, however abstract it may be, must be able to produce concrete results on the spot; if its materialisation posed problems, he would not hesitate to compromise its abstract beauty, to resort to 'bricolage'."[14]

"[...] you have to imagine as much as possible, explore as much as possible what a programme is capable of producing, and see whether the results are valid. This is where you judge: you are the filter, you say 'Yes, it's worth it; no, it's not worth it'. So you have to change some things or throw out the programme entirely and take another one."[15]

This last quotation forces us to relativize the importance of "out-of-time", a fundamental category of the composer's thought on which all his theoretical writings are based, since, as we have just seen, its value is determined in the last instance by the way in which it fits with a particular aesthetic purpose. If the aesthetic goal is not achieved, the programme is replaced outright until a better one is found. I believe it is impossible to find a more pragmatic criterion, in an *a posteriori* selection process where the coherence of the whole is not essential. This Xenakis's heuristics at work.

The selective "filter" operated at all levels of the musical construction, and first of all in the overall determination of the "out-of-time" inside which the work would be lodged. In a large number of pieces, this was a necessary prerequisite for composing. In other pieces, the inspiration took the form of a calculation. This option created a whole network of intermediate possibilities, one extreme of which is given by the total agreement between the results coming from probabilistic formulas and the aesthetic objective (*Pithoprakta*) and the other constituted by the negation of all mathematics (*Polla ta dhina*).

I. X. – [...] "there intuition was at work again. Which means that after the experience of the previous works, it was easy to simulate lots of things. That's what I did, without any calculation — in other words, it went by itself."

F. D. – "Do you mean that you have recreated something that is, in short, in the same style . . . as the pieces in the ST series, for example?"

I. X. – "Or before, or from *Pithoprakta* too."[16]

Now, what could lead Xenakis to link here two intellectual projects as different from one another as those at the origin of *Pithoprakta* and *Polla ta dhina*, if not, precisely, the relativisation of the importance of "out-of-time" and formulas?

But there is yet another area where subjectivity is decisive: when the confrontation with the materials was done by taking into account the totality of the work. Here, the words come together and the ideologies intersect. One recognises, among others, Webern's "intuition of the work as a whole" and Boulez's "sound evidence"...

I. X. – "[...] it is necessary that one sequence after another, even if these sequences obey a global architecture, should be valid. So how do I know they are valid? Well, since I'm doing this on paper, when it comes to the orchestra, I try to imagine, with an effort of imagination, and little by little I master my business.

[...] what happens if you let yourself be surprised or attracted by detail is that you get lost in the forest and you forget that there is a whole which is important from a musical point of view; and you break your teeth on that. That is the great danger. To avoid

---

[13] « […] il y a un grand quiproquo et Xenakis lui-même l'a entretenu, c'est qu'on a assimilé sa musique à une systématisation de transferts de modèles mathématiques à la composition ; mais, lorsque l'on regarde dans les faits, bien qu'il y ait une sorte d'algébrisation intellectuelle constante, on s'aperçoit que les deux tiers, si ce n'est les quatre cinquièmes de sa production sont faits "à la main". »
« Entretien Pascal DUSAPIN / Harry HALBREICH »,
in *Regards sur Iannis Xenakis*, Éd. Stock, Paris, 1998, p. 345-346.
[14] « De sa formation d'ingénieur, le compositeur a conservé le souci de l'efficacité : la théorie, aussi abstraite qu'elle soit, doit pouvoir être concrétisée sur le champ ; si sa matérialisation pose des problèmes, il n'hésitera pas à en compromettre la beauté abstraite, à faire appel au bricolage. »
Makis SOLOMOS – *Iannis Xenakis*, P.O. Éditions, coll. Compositeurs,
Échos du XXᵉ siècle, Les Grands Champs, Mercuès, 1996, p. 112.
[15] « […] il faut imaginer autant que possible, explorer autant que possible ce qu'est capable de produire un programme, et voir si les résultats sont valables. C'est là où vous jugez : vous êtes le filtre, vous dites "Oui, ça vaut le coup ; non, ça ne vaut pas le coup". Alors il faut changer certaines choses ou balancer complètement le programme et en prendre un autre. »
François DELALANDE, *op.cit.*, p. 31-32.
[16] **I. X.** – […] là c'est l'intuition de nouveau qui a fonctionné. C'est-à-dire qu'après l'expérience des œuvres précédentes, il était facile de simuler des tas de choses. C'est ce que j'ai fait, sans calcul, c'est-à-dire que cela allait tout seul, quoi.
F. D. – C'est-à-dire que vous avez recréé quelque chose qui en somme est du même style ... que les pièces par exemple de la série ST ?
I. X. – Ou avant, ou de *Pithoprakta* aussi.
François DELALANDE, *op.cit.*, p. 73.

that, you have to keep the whole thing constantly in mind, even if you're working with individual pieces."[17]

It remains to be seen how chance actually relates to the aesthetic ideal. For all that we have just seen, it is clear that nothing remains further from the Xenakian project than the use of the calculation of probability without determined selection criteria. So whenever he refers to chance, it is not the phenomenon in its pure state, but "aesthetised" chance, or a "pseudo-chance". And for good reason: pure chance is too hazardous to allow for any kind of prediction, it is ungovernable, and moreover it contradicts Xenakis's own image of the role of the composer and his responsibility. In this sense, the following criticism of serialism – just like everything else he had written during the 1950s about it – mixes up various kinds of data while at the same time revealing the profile of his heuristics:

"In order to get out of the cascading contradictions, it was necessary to appeal first to an extended deterministic combinatorics and then to the notion of the sound cloud, i.e. to the massive sound being. These two considerations also lead to the theories of probability calculus which classify strict determinism as a special case of a more general logic, whose limit is pure chance."[18]

In fact, he uses the calculus of probabilities as an memory aid that can be corrected, as if it were in fact a series of default values that allow him to save a lot of time in the global determination of a phenomenon. But, let me insist on this point, Xenakis's music is not defined by calculation but by the work of interiorisation – the active imagining – that Xenakis applies to it. And it is thus, and only thus, that the sufficient meets the necessary in the composer's expression.

3. The composer's responsibility in the face of chance

The heuristics of Boulez and Xenakis in the 1950s converge overall in that they attempt to conceal the free will, the choice, the intuition of the composer, by concealing it under the folds of a highly formalised discourse, where everything is mentioned except what is essential. The ambition of both is to legitimise the work scientifically, objectively, mechanically and automatically by side-lining the individual and his potential.

Thus Boulez:

"[...] the form depended directly on the modes of use of the system. Moreover, the dream – the nightmare, perhaps – of a 'work' beyond the individual, beyond the accident, of a work in which the composer, having carefully prepared his basic material, had almost nothing left to do but launch the mechanism thus assembled and let it accomplish its realization, became true."[19]

and Xenakis, about the realisation of *Achorripsis*:

I.X. – "[...] it corresponds to the basic idea of unifying and making a kind of sound automaton that would work by itself once you put the plug in."[20]

But at the same time, both statements call for a deontology, a code of conduct for the composer, based on playing his part responsibly. This is obvious in the way both Boulez and Xenakis criticised Cage and the indeterminacy of form:

"Suffocating in the closed prisons of numbers, one rushed to the outside, the first opportunity was the good one; and then EVERYTHING was allowed, including the most vulgar exhibitionism... And what do this general permission, these great holidays

---

[17] **I. X.** – « […] il faut que, séquence par séquence, même si ces séquences obéissent à une architecture globale, elles soient valables. Alors, comment je sais qu'elles sont valables ? Eh bien, puisque c'est sur papier que je fais ça, quand il s'agit d'orchestre, c'est en essayant d'imaginer, avec un effort d'imagination, et petit à petit je domine mon affaire.
[…] ce qui se passe si on se laisse surprendre ou attirer par le détail, c'est qu'on se perd dans la forêt et qu'on oublie qu'il y a un ensemble qui est important de point de vue musical ; et on se casse les dents là-dessus. Ça, c'est le grand danger. Pour éviter cela, il faut avoir constamment dans la tête l'ensemble, même si on travaille avec des pièces détachées. »
François DELALANDE, *op.cit.,* p. 43.

[18] « Pour sortir des contradictions en cascade, il fallait faire appel d'abord à une combinatoire déterministe élargie et ensuite à la notion de nuage de sons, c'est-à-dire à l'être sonore massique. Ces deux considérations conduisent

également aux théories de calcul de probabilités qui classent le déterminisme strict comme cas particulier d'une logique plus générale, dont la limite est le hasard pur. »
Iannis XENAKIS – *Musique, Architecture*, Caserna/poche - Mutations - Orientations, Paris, 1971, p. 23-24.

[19] « […] la forme dépendait directement des modes d'utilisation du système. De surcroît, se réalisait le rêve — le cauchemar, peut être — d'une "œuvre" au-delà de l'individuel, au-delà de l'accident, d'une œuvre où le compositeur ayant préparé avec soin son matériau de base, il ne lui restait presque plus qu'à lancer le mécanisme ainsi monté et le laisser accomplir la réalisation. »
Pierre BOULEZ – « Le Système et l'idée », *art.cit*., p. 87.

[20] **I. X.** – « […] cela correspond à cette idée de base qui est d'unifier et de faire une sorte d'automate sonore qui marcherait tout seul une fois que vous mettez la prise de courant. »
François DELALANDE, *op.cit.,* p. 66.

---

of thought, mean if not, always, the flight from responsibility . . .?"[21]

    "In this group, it is fashionable not to write notes but a drawing. 'Music' is judged by the beauty of the drawing. It has annexed the so-called 'random' music which, in fact, is only an abuse of language, the real term being grandfatherly 'improvised' music . . .

    They have faith in immediate action and care little for controlling thought. But since musical action has an imperative need for reflection on pain of trivial improvisation, imprecision and irresponsibility, these groups, in fact, deny music and drag it out of itself."[22]

    Now, the contradiction with the previous quotations (19 and 20) is flagrant, for the composer cannot, at the same time, assume and relinquish his responsibility as a creator . . . Either the system is all-powerful, and the individual disappears behind it, or, conversely, the individual imposes his rules on the system. But the two modalities cannot be applied simultaneously.

    For people of the stature of Boulez and Xenakis, this consequence could not go unnoticed. It led them inexorably to distance themselves from their initial projects.

CODA

I have pointed out a number of inconsistencies in the statements and procedures of Boulez and Xenakis. My concern was to demonstrate the inconsequentiality of their statements in relation to the processes of music-making that they were experiencing. The contradictions of their discourse would certainly lead to terrible consequences if the truth of their claims were at stake, if we were to take what they say at face value. But the paradigm of the creator does not collapse for lack of logical coherence, quite the contrary: incoherence and contradiction are the real fuel of creation, that which is never discussed, but, in the end, is the only thing that really counts. What a composer claims do not have to be true, but it must be plausible enough for him, to serve as a vehicle for his own convictions.

    This is musical heuristics at work.

BIBLIOGRAPHY

1) BOULEZ, Pierre - *Penser la musique aujourd'hui*, Gallimard, 1963.
2) ----, *Relevés d'apprenti*, Paris, Seuil, 1966.
3) ----, « Le Système et l'idée », in*HARMONIQUES* nº 1, Paris, IRCAM/Ch. Bourgois, 1986.
4) DELALANDE, François – *Il faut être constamment un immigré – Entretiens avec Xenakis*, Bibliothèque de Recherche Musicale, INA – Buchet/Chastel, Pierre Zech éditeur, Paris, 1997.
5) « Interview Pascal DUSAPIN / Harry HALBREICH », in *Regards sur Iannis Xenakis*, Éd. Stock, Paris, 1998.
6) MATTER Henri-Louis – *Webern*, Éditions l'Âge de l'Homme, 1981.
7) SOLOMOS, Makis – *Iannis Xenakis*, P.O. Éditions, Mercuès, 1996.
8) XENAKIS, Iannis – *Musique, Architecture* – Caserna/poche – Mutations – Orientations, Paris, 1971.
9) WEBERN, Anton – *Chemin vers la nouvelle musique*, ed. Jean-Claude Lattès, 1980 for the French translation.

---

[21] « Étouffant dans les prisons closes du nombre, on s'est rué vers l'extérieur, la première occasion était bonne ; et alors TOUT fut permis, y compris l'exhibitionnisme le plus vulgaire… Et que signifient cette permission générale, ces grandes vacances de la pensée, sinon, toujours, la fuite devant la responsabilité... ? »
Pierre BOULEZ – *Penser la musique aujourd'hui,* coll. « Tel », Gallimard, 1963.

[22] « […] Dans ce groupe, il est de bon ton de ne pas écrire de notes mais n'importe quel dessin. On juge la "musique" sur la beauté du dessin. Il s'est annexé la musique dite "aléatoire" qui, en fait, n'est qu'un abus de langage, le vrai terme étant musique "improvisée" de grand-père…
Ils ont foi en l'action immédiate et se soucient peu d'un contrôle de la pensée. Mais comme l'action musicale a un besoin impérieux de réflexion sous peine de basculer dans la triviale improvisation, l'imprécision et l'irresponsabilité, ces groupes, en fait, nient la musique et l'entraînent hors d'elle. »
Iannis XENAKIS – *Musique, Architecture*, *op. cit.*, p. 38.