Temporality in Xenakis and Ferneyhough

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Abstract

This article comprises a comparative exploration of the conception of temporality by Iannis Xenakis and Brian Ferneyhough, as well as a study of their compositional responses to this conceptualization. Xenakis remarked that music exists primarily "outside of time," whereas Ferneyhough reflects on the "tactility of time." These ideas are developed here within a phenomenological framework, with particular reference to concepts by Jean-Luc Nancy, mainly those of *sense* and *resonance*. When cross-examined, Xenakis's and Ferneyhough's approaches, although quite different, are shown to resonate with each other, as both developed compositional methods based on sieves: the former for the production of sonorities and the latter as a means to formal articulation.

We have to consciously destroy these liminal structures of time, space, logic…

—Iannis Xenakis

To notate the work is at one and the same time to listen to its echo.
—Brian Ferneyhough

1. Introduction

The figures of Iannis Xenakis and Brian Ferneyhough occupy distinct positions in the history post-WWII composition. Their oeuvre has preoccupied performers and musicologists in quite different ways. However, whereas the former would not hesitate for a moment to programme works by the two composers in the same concert, musicological work has insisted in keeping them apart. This is justifiable considering their different historical milieux. The two composers are almost one generation apart and Ferneyhough has referred to Xenakis only in passing[1] (when he differentiated his approach from that of the younger generation, who have studied Xenakis's work more closely; see Ferneyhough 1995: 425). Further, their compositional engagement exhibits sharp differences: whereas the name of Xenakis implies a "scientificist" approach, Ferneyhough is associated with "complexity." However, although their differences are significant, such comments seem to only scratch the surface as they point to one-dimensional labels of no consensual acceptance (certainly not by the composers themselves).

This article aims at unfolding a comparative study of intellectual and musical divergencies and convergences between the two, as they can be seen in their conception of musical temporality and in their respective compositional methods. After I briefly introduce their differences in compositional practice, I examine their conceptualization of temporality and then, back to their compositional attitude, I analyse their particular responses to issues raised by their critical thinking of musical time. The latter are located in the treatment of musical entities, formal articulation and practices of notation. My philosophical examination relies on the work of Jean-Luc Nancy with particular reference to his notions of *sense* (*sens*) and *resonance*. The former is taken in its two meanings of the bodily sense of sensibility (sensation) and that of intelligibility

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[1] One exception is his collaborative article on Xenakis's *ST/10-1 080262* (Keller and Ferneyhough 2004).

(understanding). Resonance, by analogy, is related here to a certain sonorous materiality and to musical representation through notation. The former pertains mostly to Xenakis's practice and the latter to that of Ferneyhough.

Xenakis's and Ferneyhough's practices are indeed distinctly different: the former favoured a statistical approach to handling the global and local properties of sound masses, whereas the latter's compositional strategies frequently employ linearly-conceived multiple layers of musical activity. Interestingly (or even strangely) when it comes to their conception of musical time, it is Xenakis who thinks linearly whereas Ferneyhough allows for a greater degree of complexity in temporal interpretation. I will show that ultimately, when cross-examined against Nancy's categories, both composers have touched upon different aspects of the same problematics of temporal experience in music. That is, the point of contact of their differing practices is precisely the idea that meaningful musical experience is beyond temporal linearity: to the former, this corresponds to the outside-time category and to the latter to oblique temporal sensations.[2] Xenakis's compositional response re-invented the musical scale as multiplicities of timbre classes, which he termed *sieves*; Ferneyhough's compositional strategies re-inscribed the function of complex notation and developed musical processes that correspond to what I call *formal sieves* of competing and interfering concurrent processes.

Let us take two works from either composers' early period. Xenakis first conceived of mass sonorities for *Metastaseis*, but the formal introduction of stochastics came with *Pithoprakta* (1955-56). The orchestra is divided to the extreme and the work follows what Solomos has called the "sound model" (1996: 27), progressing from noise to pure harmonics. Measures 52-59 comprise a well-known stochastic paradigm, a cloud of over one thousand glissandi allocated among the instruments according to a particular distribution (Gaussian). Example 1 shows the graph sketch by Xenakis and Example 2 the corresponding part of the score. Linearity has completely disappeared

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[2] Regarding linearity for example, both Xenakis and Ferneyhough identified the discrepancy between process and result in serial music. The former indicated "a contradiction between the linear polyphonic system and the heard result which is surface, mass" (Xenakis 1994: 42). Ferneyhough held the same point, in particular about integral serialism (see Ferneyhough 1995: 78), although his critique was directed to the responses to this impasse (as he was writing this much later). In any case, both composers responded differently to what they identified as the same problem: Xenakis by rejecting linearity and introducing the category of mass sonorities and Ferneyhough by developing complex multi-linear processes.

and forward motion is achieved almost exclusively by manipulating the sound mass and its evolution in time (by changing its direction, average density, instrumentation, timbre, intensity, etc.). Ferneyhough's *Epicycle* was composed in 1968 for string ensemble or "twenty solo strings" based on a "soloistic voice-leading" (Ferneyhough 1995: 89). In this case, individuation of the ensemble has not lead to mass sonorities; to the contrary, as it can be seen in Example 3, the individual instrumental line is meant to engage each performer in a polyphonic, mimetic, or homophonic whole. These compositional attitudes have been maintained by both composers throughout their oeuvre; however, they have changed in form, as new considerations arose. One overall guiding theme, common to both, is none other than the role of temporality in music perception and composition.
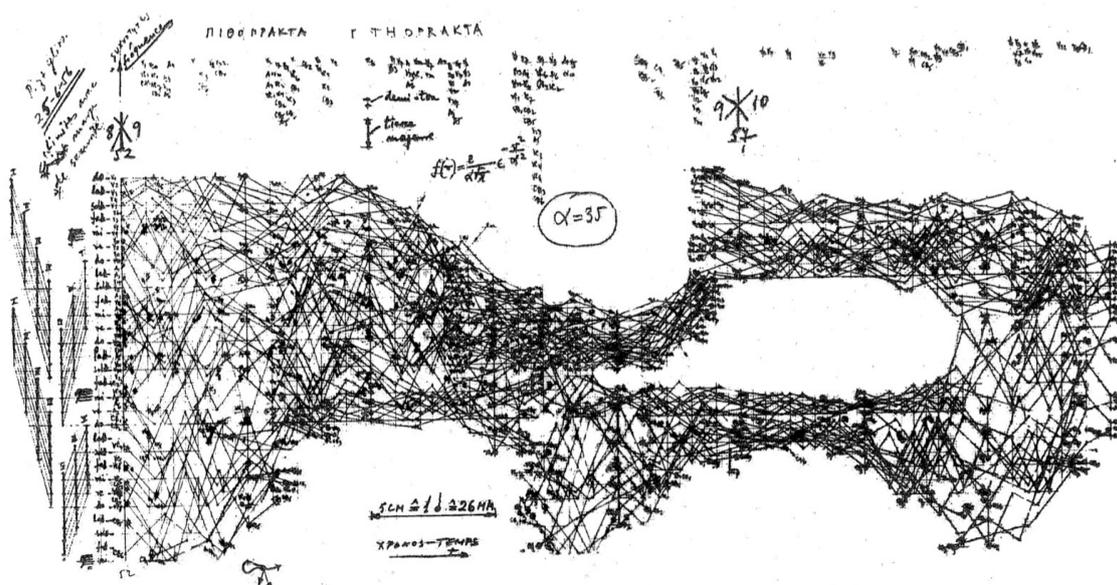
Example 1. Xenakis, Pithoprakta, manuscript graph of mm. 52-59. Source: Xenakis Archives. Reproduced by permission.

Example 2. Xenakis, *Pithoprakta*, mm. 52-57. © Copyright 1967 by Boosey & Hawkes
Music Publishers Ltd. Reproduced by permission of Boosey & Hawkes Music Publishers
Ltd.

Example 3. Ferneyhough, *Epicycle*, p. 13. © Copyright 1968 by Hinrichsen
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2. Temporality

The discussion of time in music inevitably defines one's approach to ontological issues, such as the status of the musical work and its perception—issues that pertain to the construction and treatment of sonic objects as well as overall formal articulation.[3] The matter is not simply the treatment of metric and rhythmic structures, but an approach to *temporality*, as that which enables and structures the experience of music. This involves a phenomenological discussion on the perception of time and space through the senses or the mind; as well as on the experience of subjectivity, presence, or materiality. Such themes, to the extent they relate to the thinking of Xenakis and Ferneyhough, permeate the discussion unfolded in the remaining of this article.

Both Xenakis and Ferneyhough have published extensively on their philosophy and practice. Their explicit preoccupation with temporality can be seen in a few texts of the 1980s, where they introduced their themes and references, as well as examples of compositional techniques and specific works. These texts, such as Xenakis's "Concerning, Time, Space and Music"[4] and Ferneyhough's "The Tactility of Time," discuss the temporal in terms that are akin to a phenomenological reading. Thus, I propose a provisional, introductory reading according to concepts by Edmund Husserl and Martin Heidegger for Xenakis and Ferneyhough respectively; but ultimately, both composers' ideas are shown to resonate with distinct categories of Jean-Luc Nancy's philosophy, as his thinking relies on the phenomenological tradition of the above-mentioned thinkers.

Over the decades, as I have already indicated (Exarchos 2015), Xenakis's account of temporality took two forms: earlier, in a compositional/analytical account he discussed the matter in relation to structures like sets, scales, and sequences; later, in a more philosophical account, he discussed this in terms of perception, exploring the importance of mnemonic traces during listening. As I will show, Xenakis suggested that our perception is constantly shifting—in a sort of quantum leap—between the temporal and the non-temporal aspect of music. Ferneyhough's account of temporality uses terms such as "tactility" in order to denote a "concrete," "physical" sense of time. He conceives of temporality in relation to a non-linear sensation of time: a linearly-

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[3] However, a problematics of musical ontology cannot be exhausted here.
[4] Henceforth "Concerning Time."

conceived temporal flow—although an immediate given—is not what structures musical experience. Further, he made explicit that such considerations are directly related to music's ontological status (with reference to Derrida) and that this status essentially depends on a special kind of motion. Echoing Xenakis, Ferneyhough suggests that the listening subject at moments "stands apart" and consciousness is engaged in an act of scanning and measuring outside of the immediate time-flow.

2.1 Xenakis

Xenakis denied the importance given by most composers to the temporal aspect of music. He explicitly privileged that which is ontologically independent of time, that which "remains of music once time has been removed" (1976: 211). His practice was largely intended to provide alternatives to articulating the non-temporal; as such, his theory of sieves (see Xenakis 1992: 268-276) was meant to provide tools for the construction of *outside-time structures*.

Interested in the mensurability of time, Xenakis considered time as a *linear structure* that can be "expressed with real numbers, and shown as points on a straight line" (Varga 1996: 82-83).[5] In several writings, Xenakis demonstrated his theory of temporality as a schema of two categories: outside-time and inside-time, while occasionally he would include a third, the *temporal* category. Any structure that does not require concepts of causality (e.g. "before" or "after") in order to be described is outside of time; whereas, if causal terms are necessary, the structure is inside time.[6] Therefore, a scale is outside of time but a melody based on that scale is inside time.[7] Rhythmic and durational structures (or the overall temporal structure of the work), is where outside-time structures are mapped onto, in order to produce the work inside time. This third term, the *temporal* appears only idiosyncratically in Xenakis's writings; as I have shown (Exarchos 2008: chapter 1), his schema eventually collapses into two categories, if anything, because the middle term can be viewed by both angles: as a

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[5] This linear conception of time does not imply, of course, that Xenakis's music does not include non-linear forms.

[6] Although succession and causality might not always be identical, Xenakis links the two in his discussion of chains of events and their reconstruction in memory (1992: 263), which I will examine later.

[7] A mathematical equivalent would be the distinction between set (outside of time) and sequence (inside time): the set's elements are arranged according to their intrinsic properties (e.g. smaller to larger), whereas the sequence requires a certain ordering (including any repetitions).

rhythmic sequence (whose elements follow the logic of causality), it is inside time; as a mensurable structure it is outside of time. Xenakis's compositional response came with the theory of sieves. This is a method for the production of scales (either as pitch scales or as rhythmic sequences), based on residue classes and set-theoretical operations on these classes, aiming at deeper levels of symmetry via a number-theoretic approach. What is important for my point here, is that Xenakis privileged the construction and use of scales over recourse to melodic shapes. Considering that his abstract image of time as points on a straight line is also the abstract schema of a sieve, he was able to maintain that rhythmic/durational structures too have an outside-time aspect. Already from the 1960s, Xenakis went as far as to claim that, although there is such a thing as "rhythm in its pure form," all music has an outside-time nature (1994: 68).

During the 1980s he was increasingly concerned with temporality and the perception of time in listening. His main thesis that music takes place mainly outside of time remained, but he was now preoccupied with *how* this is possible.[8] In "Concerning Time"9 Xenakis demonstrates his approach around three key terms: *separability*, *contiguity*, and *anteriority*. The first two are prerequisites for the third and as such, I suggest, they are more important. It is necessary that events are separable in order to be perceivable; that is, events need to be experienced as discreet, so that we can compare them and perceive the temporal relations between them. This separability is in turn co-dependant with contiguity, the state of direct contact; this is an invocation of materialism (see Xenakis 1992: 203), as direct contact of separate entities implies a fundamental materiality. Finally, anteriority stands for succession, causality, that which exists inside time.

Concerning the first term, Xenakis uses the metaphor of the trace in relation to temporality: "Thanks to separability, [perceived] events can be assimilated to *landmark points* in the flux of time, points which are instantaneously hauled up outside of time because of their trace in our memory" (1992: 264).[10] As I suggested earlier, this is an

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[8] For Xenakis the inside-time category refers to the instantaneous, that which "does not exist" (Xenakis 1969: 51). In this sense, his philosophy of music was in search of an ontology rather than a dialectics.

[9] The history of this article can be traced back to 1981, while it received its final form in Xenakis 1992 (see Solomos 2001: 237).

[10] The function of tracing relates directly to that of writing and Xenakis has occasionally referred to time as a blank blackboard into which structures are inscribed (see Xenakis 1992: 173 and Varga 1996: 84). For a critical exploration of the deconstructive function of writing in Xenakis's dichotomy see Exarchos 2008: chapter 2.

instance of how music in general—including rhythm—is placed outside of time. Although Xenakis has not referenced Edmund Husserl except once in a footnote (1992: 377 n. 1), we can find a Husserlian element in this approach to time-consciousness. Xenakis's account is phenomenological to the extent that it is concerned with what presents itself to consciousness. Importantly, in phenomenology the viable question does not relate directly to the ontological status of things independent from experience, but to the way reality discloses itself to, or constitutes itself in conscious experience. According to Husserl, the experience of spatiality cannot be separated from a certain temporality. He maintained that both past and future elements are incorporated in the constitution of momentary sensation, in a movement of *retention* and *protention* (anticipation). Husserl's favoured example for this was the "tonal process" of the melody. He considered the melody as a unitary temporal object that "is past only after the final tone is gone" (1991: 40). However, like Xenakis, he insisted on the *discreteness* of individual tones—the tone given now, the tones elapsed, and the ones anticipated. In Husserl's words, "at any given time only one punctual phase is present as now, while the others are attached as a retentional tail" (1991: 41). Experiential unity as such is achieved via mnemonic means (retention being our short-term memory, as opposed to *recollection*). We see in this way, that Xenakis's account echoes Husserl's with regard to the basic postulate of the separability of individual events.[11]

This linking of time and space is also found in Xenakis's own conception; in particular, he suggests that space is perceptible only across the infinity of "chains of energy transformations" (Xenakis 1992: 257). In a materialist world-view, a void in space-time is inconceivable by immediate consciousness. Thus, the events in such chains are necessarily contiguous (and separable). Given the above presuppositions, Xenakis suggests a thought experiment:

> Two chains of contiguous events without a common link can be indifferently synchronous or anterior in relation to each other; time is once again abolished in the temporal relation of each of the universes of events represented by the two chains (1992: 263).

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[11]I have indicated the connection between Husserl's and Xenakis's accounts of temporality in (Exarchos 2012: 9) where I also related this to Xenakis's "interpenetration of the tenses."

Therefore, separation and direct contact of events are the essential conditions for the temporal experience; for perceiving, that is, events in temporal succession (Xenakis's *anteriority*). So, when Xenakis talked of the "removal of time" he must have meant the removal of one or more of these three aspects. The removal of separability would abolish time due to absolute smoothness; that of contiguity would render time inconceivable; and the removal of anteriority would entail a universe of absolute simultaneity (see Xenakis 1992: 262-263).

We see therefore how Xenakis defines time as causality or succession; in other words, one-dimensional, linear. However, this is precisely why Xenakis insisted so much on the outside-time category; the everyday conception of time is that of linear time, which music has nothing to gain from, as it operates outside of such linearity. Xenakis's treatment relies on a certain spatio-temporalizing movement that structures temporal consciousness due to contiguity and separability, and which is not very different from the idea of a phenomenological primary spatiality/temporality that enables the experience of everyday space and time as such.

2.2 Ferneyhough

At around the same time as Xenakis, Ferneyhough presented his theorization of temporality in the "The Tactility of Time," originally a talk at the Darmstadt Summer Course of 1988 (Ferneyhough 1995: 42-50), where he discussed the possibilities of a *palpable* sensation of time in music (cf. Ferneyhough and Boros 1994: 123). Unlike Xenakis, Ferneyhough presupposes a non-linear conception of time. The possibility for concrete temporal sensations can only arise in moments when perception is detached from the immediate time-flow, "standing apart" and operating on a "speculative time-space" (Ferneyhough 1995: 43). Ferneyhough's talk comprises a programmatic statement in search of an appropriate language on temporality, with regard to *Mnemosyne* (composed in 1986 for bass flute and tape, as the final part of the *Carceri d'Invenzione* cycle). The resonance with Xenakis's account, especially the idea of standing-apart, is a further suggestion of such potential. In order to do so, it is necessary to refer to certain developments of Husserl's ideas in the work of Martin Heidegger.

Compared to Husserl, Heidegger was more interested in perception as the *purposeful* involvement in the concrete world.[12] Such involvement means that being is being-in-the-world, a world that is always already there; thus, spatiality is an *event of disclosure* or *opening* to the world. According to Morin (2012: 24), the mode of disclosure is that of "understanding," the decoding of a context and of available tools (although such understanding need not be conceptual). Spatial experience is always also temporal and as an opening to the concrete world the structure of temporality is "ecstatic" ("standing outside of") (cf. James 2006: 84).

Similar to Xenakis's placing outside of time, Ferneyhough's "standing-apart" denotes the "ecstatic" structure of temporality. Whereas the former conceived it (in a Husserlian manner) as a process of retentions and protentions, for the latter standing-apart takes place during our engagement with music (the "world") which is conceived as a complex dynamic process involving the here-and-now of one's own meaningful experience. This is clear in Ferneyhough's essay when he invokes the schema of the feedback loop between bodily temporality (breathing, heartbeat, etc.) and the "metric lattice" that mediates musical objects. The perception of time is conditioned by this relationship, according to a continually moving perspective. Ontological overtones arise at the conclusion of his argument: the listener's perspective changes constantly with respect to "the understanding of what is to count as an object at that point in the relationship" (Ferneyhough 1995: 44). Here, "standing apart," "measuring," "scanning," all refer to the kind of movement of projecting forward and backward, beyond mere retentions and protentions, according to an "irregular segmentation of experiential continuity" (Ferneyhough 1995: 43), a temporal continuity of differentiated "thickness." Such measuring is then constantly re-evaluated, according to the relationship between the two aforementioned poles (bodily condition and metric lattice), in the process of being constantly engaged with the music in a way that affords an experience beyond momentary immediacy. This is possible because our attempts of temporal interpretation are non-theoretical; Heidegger (1996) terms this kind of engagement *circumspection*. Opposed to theory or to leisurely looking around, circumspection refers to an attentive

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[12] He criticized Husserl for the ideality with which he had invested his phenomenological account, such as his *phenomenological reduction*, which excludes knowledge, belief, or other preconceptions when studying the experience of the world; or, such as his *transcendental ego*, that functions as the ultimate foundation of the relation between acts of consciousness and its objects.

and associative interpretation of actual affordances and possibilities in one's being-in-the-world. Such temporal interpretation is based on an ever-changing perspective of a projected future. Although retentional memory is also important, Ferneyhough's non-linear conception of time allows him to speak of "obliqueness" in the temporal experience (1995: 49), in a way that defies the Husserlian schema: the experience of listening "circumspectfully" goes beyond the paradigm of the linear melody.

A few years earlier, in "Il Tempo della Figura" (1995: 33-41) Ferneyhough discussed the general possibilities of energy release, which he terms *force*, conceived with the aid of a basic distinction between *gesture* and *figure*.13 The former is comparable to the linguistic vocable, a part of rhetoric with no inherent capacity of expressive energy (it is only expressive of sentiment). In contrast, the term *figure* is used to indicate a certain kind of "energetic volatility" as the potential of concrete gestures. Ferneyhough's exposition of such thoughts is introduced by the image (borrowed from a poem by John Ashbery) of a breaking wave. The *figure* relates to a wave breaking on a rock, whereby *gesture* expresses a shape that it gives up immediately: a shape that we realize only after it is gone (Ferneyhough 1995: 33). By avoiding proper definitions, Ferneyhough's compositional thinking invokes the figure as the "aura" that is potentially found in any concrete gesture, constellation, or formal unit (Ferneyhough 1995: 37). What allows him to indicate the place of the figure at the intersection of already-defined "vocables" is precisely his insistence on the nature of temporality in relation to conscious perception. According to Fitch, "Figurally charged parameters seek to escape the gesture, and the latter to recapture them, albeit incurring damage in the process. The continuous journey of the figural, from synthesis, to independence and 'back to' renewed synthesis … implies a temporal progression" (2005: 419-20). This insistence on movement allows Ferneyhough to think of the figure as an essential potentiality of musical consciousness: "our 'life-line' to reality might perhaps be interpreted as a special form of motion;" this is the movement of the breaking wave where "the present constitutes itself only as sensed absence" (1995: 35).

These sentences echo Derrida's discourse (1997) and Ferneyhough is quite explicit about the importance of *différance* in conscious experience and its temporality:

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13 See also Ferneyhough 1995: 21-28 & 131-38.

> Musical consciousness is always the impingement of the past upon the array of possible futures to which (*pace* Derrida) it continually defers. The moment itself is defined, not by any constancy of material substratum, but by its motion; it is the projection of figural energies which *make the pointer visible* by means of which the motion is measured (Ferneyhough 1995: 36).

This is not only anti-materialist, but also anti-foundationalist. The absence of ground appeals to the deconstructive claim against stable meaning: the breaking wave, one may say, is not receptive of damming barriers. Différance (an economic concept for differing/deferring) describes the kind of movement according to which "figural energies" afford the capacity of temporal measurement. The above quotation further reveals Ferneyhough's focus on the *projection* of energies, that is, on the *futural* aspect of temporality. This future—always deferred—is conceived as the oblique directionality of time. Using Heidegger's terminology, "being futural" refers to Being (*Dasein*) "running ahead" towards its ownmost possibility. But this future is not conceived in any narrow sense of an "already-there" that is in store for us; rather, this futuralness *is* Being itself:

> In running ahead there is neither expectation of something in the future nor is there a free-floating "future as such." Running ahead "is" that being's future which it itself is. But to be futural means to be "temporal." Here, temporal does not mean "in time" but time itself (Heidegger 2011: 48-49).

Overtones of such finite directionality can be heard in Ferneyhough's take on the time arrow in relation to the musical object: the greater the consistency of autonomy of the musical object the more the time arrow that traverses it is "bent." Reciprocally, the temporal "vector" damages the object; time is in a sense a force which compels the object to "reveal its own generative history" (Ferneyhough 1995: 45). This reciprocal relationship between object and time is essentially what gives rise to the musical figure as an event of confrontation and a process of energy accumulation and expenditure.

3. Nancy: Sense, Materiality, Signification

The ideas presented in the previous sections should have provided an introduction to the composers' theorization and a basic philosophical contextualisation. These philosophical ideas have been taken further by Jean-Luc Nancy, whose focus is somewhat different from Husserl and Heidegger. His account of spatiality and temporality has been described as "post-phenomenological," as it moves beyond visual motifs of appearance in relation to consciousness (see James 2006: 96). For example, in *Listening* he introduces the concept of the "resonant subject" as opposed to the "phenomenological" or "philosophical" one (see Nancy 2007: 21-22). Such quasi- of post-phenomenology may enable an analysis that relies less on traditional conceptions of consciousness and subjectivity. Both Xenakis and Ferneyhough defied traditional views, such as the conception that music exists in time or that the "work" somehow remains intact and survives the sequence composer-performer-audience. The deconstruction of the Husserlian melody as the paradigm for time-consciousness can be studied in terms provided by Nancy's work, which resonates with the responses of both composers, in particular with reference the notions of *sense*, *resonance*, (sonorous) *materiality*, and *signification*.[14] Neither Xenakis nor Ferneyhough referred specifically to Nancy. Therefore, the remainder of this article will remain removed from Xenakis's and Ferneyhough's own philosophical references; it will address the possibilities of a Nancean reading, as an alternative to and not a substitute for those.15

Nancy's writing avoids strict definitions and employs a more figurative than a denotational style, a style that is a direct result of his own philosophy. Nancy accepts Heidegger's approach but insists on the latter's (undeveloped) theme of *being-with* (*Mitsein*). This came along with a shift of focus from consciousness and signification (the particular way of understanding of the world and beings) to the notion of *sense* (*sens*), a word that Nancy takes in its multiple meanings, of which two are relevant here: the bodily sense of sensibility (sensation) and intelligibility (understanding) (cf. Barker 2012). To the extent that it designates the sensible, sense presupposes a materiality; and

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[14] As part of the post-structuralist strand, Nancy's philosophy has never appeared in one definitive account that would comprise a book in the "encyclopedic" sense; on the contrary, the idea of fragmentation is central in his thinking, which appears fittingly fragmented in various collections of essays on reccurent themes.

[15] Fitch (2005) analyses Ferneyhough's notion of the *figure* in relation to Gilles Deleuze's critical analysis of Francis Bacon's work (section 1.6). See part 3 in particular for a study of Ferneyhough's notion of the tactility of time and an analysis of *Mnemosyne* and other works, based on Deleuze's conception of rhythm, with reference to Theodor Adorno and Henri Bergson.

an ontology implicated in such a thinking can only be materialist. For Nancy, it is not so much that the world makes sense (intelligibly), but that it exists *as* sense, which is the condition for the existence of language, but at the same time it transcends it. Sense is *in excess* of language, at the same time prior to it and beyond signification: it is a sense of the world that is always already constituted *as* sense. Such thinking lends itself to terms that relate to the bodily, like that of *touch*. This term implies a certain exteriority and an impenetrable concreteness: what senses is a body and the mode of sense is that of touch-separation at the *limit* (see Nancy 2008a: 17), a movement on the external limit of the concreteness of matter. The sense of touch then is a metonymy for all senses. The way this movement also implicates language is shown emphatically by the following two quotes:

> It is not a matter of signification, but of the sense of the world as its very *concreteness*, that on which our existence *touches* and by which it is *touched*, in all possible senses (Nancy 1997: 10).

> Either as an audible voice or a visible mark, saying is corporeal, but what is said is incorporeal. … Language is not in the world or inside the world, as though the world were its body: it is the outside of the world in the world (Nancy 2000: 84).

We can formulate this relationship as follows: bodies *touch* on matter, while sense (as the bodily event) exists on the outer limit of language, although simultaneously being the site where language can occur.

   The concept that implicates the multiple registers of sense and that is most relevant here, is that of *resonance*. In *Listening* it is shown to relate to both matter and signification. Nancy thinks of sound, the vibration of the auditory body, as sonorous materiality, "voluminous and impenetrable" (2007: 40). Resonance is the sounding and re-sounding of matter, as sound presupposes the contact of material bodies[16] and as vibration and reverberation it is always already a re-sounding. One could say that vibration is the rhythm of resonance and timbre its materiality. Music for Nancy is not exactly a phenomenon, as it is not brought about according to a logic of manifestation, but of "evocation." The temporality of resonance is also the spatiality of a resonant,

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[16] In a way, resonance is the touching of atmospheric vibrations on the body, on our body or the body of the instrument (be it electronic or not).

acoustic space; it is the rebound of sound in space. It is through the opening up of space that Nancy connects resonance to the function of language: although the two are by no means equivalent they do share the space designated by the "referral" or *renvoi* (2007: 7-8).[17] Music and language share the space of the sounded and re-sounded, and of the said and re-said. Signification, as a system of references, is a tracing of space, or a spacing:

> Every spoken word is the simultaneity of at least two different modes of that spoken word; even when I am by myself, there is the one that is said and the one that is heard, that is, the one that is resaid (Nancy 2000: 86).

Listening is to strain towards a possible meaning (Nancy 2007: 6); but as sense, listening is also beyond understanding (here Nancy departs from Heidegger). Music and language are implicated in a relationship of touch and separation, which allows meaning to be perceived only at the limits, at the point of contact-separation between resonant materiality and signification. The exteriority in the mode of the relation between sense (listening), signification (language) and materiality (sound) is philosophically accounted for by a movement of tracing, of writing, which takes place at the limits between signification and sense, and between bodies (of sense) and matter. Nancy terms this movement of exteriorization, of writing at the exterior limit, *exscription*. Language always exscribes; it is outside of what it inscribes, as the outside of the world in the world (see James 2006: 150). According to Morin,

> What is inscribed […] is at the same time exscribed, placed outside of language by its contact with a material instance or a technical apparatus. […] It is through this double exscription of signification and sense, and of sense and bodies, that thought can touch the thing (2012: 132).

This subtle relationship between sense and matter, and sense and language provides the main vehicle by which to understand Xenakis's and Ferneyhough's approach to temporality, via the materialism of the former and the deconstructive strategies of the latter.

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[17] *Renvoi*, from *renvoyer*, means both to echo, to reflect, to refer, and to (re)send. Although Nancy does note the *renvoi* from sign to thing, signification should be here thought of as the spacing of the plurality of the modes of signs and of the *différance* of chains of signifiers.

Resonance is also closely related to Nancy's approach to subjectivity, presence and presentation.[18] He denies the Kantian *a priori* synthesis of the sensible and the intelligible (pure presentation and philosophical presentation) and considers the grounding of this unity to be suspended. Nancy uses for such suspension the term *syncopation*. This designates an essentially temporal, if not musical, movement of presentation and withdrawal: "What is called consciousness probably never allows itself to be grasped as an identity except when it blacks out: it is the syncope" (Nancy 2008b: 10). Such a suspension suggests an interruption of the "thinking subject" (see James 2006: 48). The constitutive moment of subjectivity, Descartes' *"I think therefore I am,"* precedes the possibility of its utterance, that is, of language. Nancy's response comes not as a concept, but as the figure of the gaping mouth (*la bouche*). What thinks itself is not a consciousness but a ruptured identity which is intricately implicated in a syncopated movement (of presentation-withdrawal and of opening).[19] We can now think of Nancy's "resonant subject," as the movement of *la bouche*; this is an instance of the aforementioned move beyond phenomenology:

> It is a question […] of going back from the phenomenological subject, an intentional line of sight, to an intensive spacing of a rebound that does not end in any return to self without immediately relaunching, as an echo, a call to that same self (Nancy 2007: 21).

Because of Nancy's insistence on the *being-with*, the plurality of being presupposes a contemporaneity as exteriority. As it precedes language but also goes beyond it, the resonant subject is a movement of syncopation and opening that takes place at the limits of presentation.[20]

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[18] Kane (2012) offers an interesting comparative study of Nancy's and Schaeffer's approach to listening, with particular reference to Nancy's conception of the "resonant subject" and the the possibilities it offers of moving beyond the phenomenological subject (see pp. 444ff. in particular).

[19] In "How Music Listens to Itself" Nancy elaborates further on a musical subjectivity: "listening is musical when it is music that listens to itself" (Nancy 2007: 67). Adorno claimed that we have to rethink the musical subject, in search of an aesthetics whose "medium would be the reflection of musical experience upon itself" (Adorno 1992: 321). Maas (2005) compares these approaches and provides a study of gesture in Xenakis with reference to Delleuze and the idea of the *fold* (*plissement*).

[20] Nancy's critique of Husserl touches on subjectivity: "[Husserl] does not concentrate his ear on musical resonance but rather converts it ahead of time into the object of an intention that configures it. Sound (and/or sense) is what is not at first intended. It is not first 'intentioned': on the contrary, sound is what places its subject, which has not preceded it with an aim, in tension, or under tension" (Nancy 2007: 20).

Nancy's elaboration of a materialist ontology also invokes a term from Maurice Merleau-Ponty: *partes extra partes* (*parts outside parts*), as the mode according to which an object "acknowledges between its parts, or between itself and other objects only external and mechanical relations" (Merleau-Ponty 2002: 84). Nancy's term for such conception of the world is *ecotechnical* (Nancy 2008a: 89) and its aesthetic counterpart is *technicity*: a term that responds to the sensible dimension of experience, as opposed to the religious/poetic. As sense (the beyond of signification), technicity is also beyond "Art" and beyond the logic of the work. Technicity is "out-of-workness [*désoeuvrement*]" (Nancy 1996: 37), it places the work outside of itself as an exscription of sense; thus it evokes another instance of opening or a syncopation of presentation.

Finally, Nancy's take on musical time has clear references to his de-centred subjectivity and syncopated presence. He defines rhythm as

> the time of time, the vibration of time itself in the stroke of a present that presents it by separating from itself. […] Rhythm separates the succession of the linearity of the sequence of length of time: it bends time to give it to time itself (Nancy 2007: 17).

This folding and unfolding movement is what gives rise to the resonant subject, to the extent that its temporality conditions its meaning. This is what Nancy means when he says that music "anticipates [the] arrival [of presence] and remembers its departure, itself remaining suspended and straining between the two: time and sonority, sonority as time and as meaning" (Nancy 2007: 20).

4. Xenakis and the Spacing of Time

Let us now return to Xenakis's thoughts on contiguity in relation to space-time, about which he poses the question: "What could […] time and space signify [if] contiguity is abolished?" (1992: 256). This is a question that relates to direct contact, to a materialist universe where no gaps are admitted. His thought experiment with the two chains of contiguous events, relates this notion (contiguity) to those of anteriority and separability. For Xenakis then, the mode of existence of entities is, in Nancean terms, that of touch-separation. The two chains in the aforementioned experiment have no common link; they can either be anterior to one another, in a relation of touch-

separation, or "indifferently synchronous," simultaneous. For Xenakis the contiguity-separability of chains of events (local clocks, as he called them) is the condition of temporality. In the case of sonorous events, this simultaneity would be the Nancean space-time of the "sonorous present" and of "sonorous place" (Nancy 2007: 13 & 16). We can then extend Xenakis's account even in the case of a single chain of events, via an analogy of spacing as tracing.

Anteriority accounts for temporality in the context of a singular instance of a chain of contiguous events. In Nancy's approach of the *singular-plural* any singularity exists in relation to other singularities. Space is the (temporal) unfolding of the exposing of singularities to one another (see James 2006: 61-62). The singular-plural mode entails a spacing, a movement of "exteriorization," a temporality that is spaced as a sharing of space-time: time is in that sense always already contemporary. As I have shown previously (Exarchos 2015), Xenakis's linking of time and space is radicalised when thought in Nancean terms: the possibility of temporal relations between the two chains of contiguous events is afforded by what the latter calls the *spacing of time*; an immediate effect of the singular-plural is that there is no pure succession without simultaneity.

The condition of the trace, which structures our temporal experience, is the contiguity-separability of entities and events. Xenakis thinks of the trace as the function of the Husserlian retention and protention; he thought that the events' traces, are "instantaneously hauled up outside of time". We can think of the trace here in the place of one of the two chains; and conversely, a single chain of events has its correlative events as traces, as another mode of the same temporal event (the sounded/resounded and the said/resaid). If, as Nancy would argue, time is always already contemporary, every sonic event is itself involved in a simultaneity brought about by a movement of tracing as the spacing of time (cf. Exarchos 2015: 9). This accounts for the Xenakian "outside of time" as what enables the experience of time in musical listening, even in the elementary instance of a single stratum of musical activity (by providing its own reference-events as traces).[21] As the contemporaneity of time is only conceivable in a

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[21] In Xenakis's compositional/analytical approach of temporality, the spacing of time is equivalent to outside-time structures as *ordered* structures, where "you can arrange all the elements into a room full of the other elements. You can say that the set is higher in pitch, or later in time, or use some comparative adjective: bigger, larger, smaller" (Zaplitny 1975: 97).

plural world of being-with in touch-separation, Xenakis's conceptualization of a universe of contiguity-separability is the prerequisite for the consciousness of time. Xenakis does use the term consciousness, but with some reservation; when he affirms that it belongs in a world of contact-separation, he also questions whether consciousness is a mental category (Xenakis 1992: 263). He does not provide an answer, but hopefully this study shows that an answer might be found in a shift of perspective from consciousness to sense.

5. Ferneyhough and Exscription

It is well known that for Ferneyhough, not only the score is not a sound-image of the work, but that the composition, in performance, is but a token of the (forced) selection-procedure by the performer. Although he employs a traditional mode of notation (that is, not graphic scores), the score is part of the work in an undecidable way (that is, according to conventional practices and uses of the terms "score," "writing," "work"). But while conventionally it might be said that Ferneyhough's scores go beyond the possibilities of representation (due to their informational overload), we see that the score operates precisely at the limits of presentation. Ferneyhough describes one of the aspects of his notational practice as the "intermediary, connecting border areas of representation" (Ferneyhough 1995: 5). He problematizes not only the notation of his own works, but the possibility of representational notation in general. This is not meant to simply say that faithful notation is impossible; beyond notation, what is problematized is the ontological status of the work itself. The work is not locatable, but is *evoked* by the notation, in a movement of a suspended presentation-withdrawal, of a syncopated presence. Thus, Ferneyhough's breaking wave is Nancy's syncope. As Ferneyhough's notation operates at the limits of representation, it invokes a function of musical notation at the "vanishing point" of musical signification. We can see this approach as *exscription*, as musical signification that exscribes a musical sense which takes place at the other side of the outer limit, as the touch-separation of sense and language.

Notation is therefore neither merely a description of sounds, nor a prescription for actions—it is not even an inscription of musical ideas; rather, the score is an exscription, an attempt to trace a specific instrumental technique and its resonance. As

such, the score is multiply removed from the sound-image of the work, although notation is as much part of the work as its performance.[22] Compositional technique is not subservient to the reproduction of internally heard sounds, but is itself an evocation of resonance (even of previously unheard-of sounds). In Ferneyhough's words, "One of the 'complex' things about 'complex' music is its quality of refusing to present a straightforward object […]: it is always perceived in the act of underlining its own ongoing and provisional nature" (1995: 69). Such provisional nature should not be taken to suggest a certain negation of the musical work; rather, it should point to the resonant nature not only of musical objects, but also of the "work" itself, indicated by the movement of the syncope (which also points to performers' and listeners' own subjectivity in Ferneyhough's feedback loop). This is what he suggests when he says that "complex" music does not rely on any representational illusion, "because of the continual problematization of the performance/interpretation context" (Ferneyhough 1995: 69).

6. Resonant Sieves

Xenakis and Ferneyhough attempted a response to the challenge of temporality in quite different ways. We see now that these responses correspond to the intricate configuration that implicates materiality and signification/representation through the movement of sense. However, it is not simply a schema of matter on the one hand and signification on the other, with sense mediating between the two. It should be clear by now that the outside/inside is not a binary opposition, but accounts for a relationship of touch-separation in fragmentary and materialist world. This is because the world is always-already constituted as sense, and in turn sense is both the possibility for language and at the same time in excess of it. According to this relation then, we can say that Xenakis's response came with a materialist world-view, a materialism that includes sound as materiality, which we can term, *sonority*.[23] In musical terms, his response took the form of pitch scales (sieves) which extend to the extremes of the audible range and which are to be performed as sonorities, rather than as scales on

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[22] Ferneyhough (1975) refers to how certain "impurities" are intended (both by composer and performer) in the attempt of a valid realisation of the score (cf. Clerc Parada 2014: 131-132).

[23] Solomos provides a post-Adornian conceptualization of sonority as the coincidence of form and (musical) material (see 1996: chapter 5). The present usage is quite different as my aims and methods here do not rely on such terms.

which melodic shapes are to be constructed. On the outside of this materialist sonorous world, Ferneyhough attempted to provide a "meaningful" place for notation, but aiming at a meaning which can only be conceived at its borders. His music ontology allows him to emancipate notation from any claims to representation, even more than language could possibly be. The latter is so because notation is implicated in a discourse of the "work" (which for Ferneyhough notation can only evoke) as an exscription at the limits of signification. What is in touch-separation with both Xenakis's sonority and Ferneyhough's exscription is precisely an excessive sense of listening: to the former listening is beyond the "liminal structures of time, space, logic" (Xenakis 1969: 51), and to the latter notating means "to listen to [the work's] echo" (Ferneyhough 1995: 5).

In other words, both composers responded to the question of temporality (and ontology) of music by dealing with two different kinds of *resonance*. Their particular responses are very close but distinct: Xenakis's sonority (as opposed to melody/harmony) is the site of touch between sense and matter (listening and resonance), while Ferneyhough's exscription (as the notation of resonance) accounts for the syncopated movement of sense at the limits of signification. Xenakis's notational practice has not received particular mention in the this article, as it never seemed to constitute a site of experimentation for him. His scores seem to mostly function as cartesian planes. In Exarchos 2015 I referred to exscription as the function of the middle category (the temporal) in Xenakis's compositional/analytical account of the 1960s. However, exscription of resonance finds a much richer meaning in Ferneyhough's approach to signification, representation and formal articulation. Similarly, Xenakis's insistent materialism is not shared by Ferneyhough, whose practice appeals more to the deconstructive function of notation, than to the physicality of sonority. Resonance therefore is to Xenakis a fundamental materiality of sound and to Ferneyhough a syncopated movement of presentation-withdrawal that implicates the subjectivity of the performer/listener and the work's sonorous presence. Interestingly, they approached this with different kinds of sieves. Although mention had been made of Xenakis's sieves as scales, Ferneyhough's sieves—to be discussed shortly—refer to formal articulation.

Xenakis utilized sieves since the 1960s, but he attempted a novel application in *Jonchaies*, as "multiplicities of timbre classes" (1977: n.p.) beyond melodic/harmonic treatment. In his own words,

> If you take a given range, and if the structure of the scale is rich enough, you can stay there without having to resort to melodic patterns—the interchange of the sounds themselves in a rather free rhythmic movement produces a melodic flow which is neither chords nor melodic patterns. […] They give a kind of overall timbre in a particular domain (Varga 1996: 145).

Later he would develop these multiplicities into a heterophonic technique that he called "artificial reverberation" (1981: n.p.); in other cases he would use sieves along with cellular automata that treat sound as a "fluid in time" (Varga 1996: 200). Sieves were used as primary material for their particular timbre, produced by playing on their continuum, linearly, as clusters, or in heterophony. A piece of this period that relies heavily on sieves is *Keqrops* (1986, for piano and orchestra). In Example 4 the winds play sieve-cluster tetrachords (each instrument plays the pitches of one tetrachord in random succession) while the piano's dense hexachords are based on a different sieve and the double basses combined with the harps play near-chromatic decachords (see Exarchos 2008: 183-184). Considering also the loud dynamics and slow tempo, the music hardly aims at any patterns other than the complex timbres thus produced. Thus, outside-time structures (sieves) are employed in order to produce resonant structures (sonorities) whose status as sonorous objects relies on a resonant materiality. To borrow Ferneyhough's image, Xenakis's music of this period corresponds more to the rock than to the wave.[24]

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[24] In a way, Xenakis's timbre classes constitute a continuation of his work on sound masses of the 1950s.

Example 4. Xenakis, Keqrops, mm. 130-33© Copyright 1986 by Editions Salabert, Paris. Reproduced with kind authorization of Editions Salabert.

In works like *Mnemosyne* (for bass flute and pre-recorded tape),[25] Ferneyhough utilizes a "filtering" of several layers, where processes might diverge or converge and thereby impulses of singular processes might coincide and even cancel each other out.[26] This kind of filtering process is as a different kind of sieve, a term Ferneyhough used to describe his compositional approach to his Second String Quartet (1995: 117-130). In this work the sieve process is aimed at "separating, as far as possible, aspects of organization from those of presentation" (Ferneyhough 1995: 118), whereby sounds stand in for silence and silences stand in for a "deliberate absence" at the "centre" of the work (1995: 117). This centre is arrived at via an accelerated convergence of musical processes (each associated with one type or sub-type of material), which interfere to the point of filtering-out or permeating each other. In Example 5 we see how m. 40, in which silence coloured by "impoverished" sounds, has undergone what the composer called a "fragile foregrounding of absence" by a multiple glissando (1995: 122). That is, two kinds of silence (literal and coloured) on two different formal layers interact in order to produce measures of one type or the other. Therefore, the method that such filtering is based on is a *formal sieve*. Such processes converge to the point of complexity shown in Example 6, where the materials seem to permeate each other; the glissandi that originally appeared as colourings of silence, now accompany the primary material in the first and then the second violin. Another instance of formal intersection between sieve-layers can be seen in the silence of m. 150. This filtering-out of the primary "unison" material by silence is not unique in the work but this time it is to be played "legato" with the same type of material of the preceding measure (unlike the abrupt "tagliare subito" in the silence of m. 133). The result is a change in the status of silence, which is now to be taken as part of the primary material (with the impossible instruction to play legato over the intervening silence). This suggests a certain absence as one "descends" to a greater convergence of musical processes, a descent that is carried out via the depth-levels provided by the layers of the sieve. The perceptual outcome of this formal sieve is for Ferneyhough a complex layering "between the

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[25] The three levels of rhythmic organization in *Mnemosyne* provide the site of multi-layered interfering functions, and they refer to (a) the downbeat stamping of the tape material; (b) the subsurface rhythmic models and their degree of explicit presentation; and (c) the interruptive activity of three independently calculated rhythmic patterns in the solo part (Ferneyhough 1995: 45).
[26] One might here note that a rhythmic model occasionally appears "syncopated" in the grammatical sense of omission.

listener and that still centre of apprehension," while listening to the work's elements "*as radiating out from it*" (Ferneyhough 1995: 118).

Example 5. Ferneyhough, Second String Quartet, mm. 39-41 © Copyright 1981 by Hinrichsen Edition, Peters Edition Ltd., London. Reproduced by kind permission of Peters Edition Limited, London.

Example 6: Ferneyhough, Second String Quartet, mm. 150-4 © Copyright 1981 by Hinrichsen Edition, Peters Edition Ltd., London. Reproduced by kind permission of Peters Edition Limited, London.

Such processes, in the above and other works, provide complex temporal frames, whereby Ferneyhough's non-linear directionality of time is constantly re-evaluated also due to the disposition of the listening body in the acoustic space. Further, as they depend on different degrees of "transparency" of the musical objects, these processes allow for varying resistances within time frames. Ferneyhough talks about the "time arrow" and how this might be "bent" at such confrontational moments. We can think this in relation to Nancy's definition of rhythm as the bending of time, the "vibration of time itself;" that is, not as the time of resonance, but, in a way, as the resonance of

syncopation, exemplified by the breaking wave. In Ferneyhough's terms, such resonant temporality is the result of the "pendulum-like motion" between subsurface rhythmic processes and the emergence of sonic events (Ferneyhough 1995: 49); events that are only perceived at the time they black out. One could say then that Ferneyhough's formal sieves are aimed at activating the syncopated movement of the work's echo.

As this article has shown, Xenakis had proceeded with increasing preoccupation with the acoustic materiality of timbre, which led to sieve-construction and complex sonorities. In a very different way, Ferneyhough's approach to temporality is inextricably linked to his notational practice, where the work (as opposed to the "Work") is evoked in a syncopated movement of presentation-withdrawal. It is a matter of two different, but associated, kinds of resonance: that of sonority (sonorous materiality) and that of syncopated presence. These involve the temporality (and spatiality) of resonance as the (re)sounding of matter, and that of the resonance of the syncope. Interestingly, both composers developed different kinds of sieves and their practice can be situated in two different "outsides" of Nancy's philosophy (materiality and signification). The relation between these is indicated by exscription; likewise, listening strains both to the limits of sonorous matter and to the echo of signification. There is no evidence that Xenakis and Ferneyhough had been in contact with each other about their ideas, nor that either of them was aware of Nancy's work at the time. However, this article has been an attempt to compare the musical thinking of these composers through their writings and work of around the same time (avoiding biographical or historical sources); admittedly, the writings by Nancy referred to here span a longer period of time, up to the recent past. However, I hope that this has proved a convincing interpretation of the thinking of all three. Further research could perhaps point to new conceptions of musical ontology and subjectivity. For the moment, the present work can also be seen as a contribution to the debate of music materiality as opposed to music signification. Neither claim can be straightforward; what I have tried here was to outline, or indeed exscribe, some ideas and practices by allowing multiple registers of resonance.

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