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Sonority – composing sound

Makis Solomos

translation from the French: Jennifer Higgins

Possibly the most important musical revolution of the 20th and 21st centuries has been the emergence of sound, and the ever-greater importance accorded to it (cf. Solomos 2019). Xenakis occupies a special place in this development, whereby, to put it simply, composition *of* sound has tended to take the place of compositions *with* sound. From the 1950s onwards, with instrumental works such as *Le Sacrifice* (1953), *Metastaseis* (1953-1954), and *Pithoprakta* (1955-1956), and electroacoustic pieces such as *Diamorphoses* (1957) and *Concret PH* (1958), he developed a conception of music focused on sound.

Xenakis himself did not theorise this new conception of composition: we know that most of his theoretical work was related to the question of the formalisation of music. However, we need only listen to his music, allow ourselves to be carried by its sensations – without seeking mathematical formulae in the sound masses that shape it, whether or not these formulae are actually present – to realise that not only is there an individual Xenakis sound (*forte* intensities, extreme registers, glissandi, etc.) but also that the music takes hold of us, seizes us from all sides; we are submerged in it: the music's energy is that of sound functioning as a vast envelope, like a rough ocean

Much of Xenakis's music, both instrumental and electronic, can be listened to and analysed as composed sound, as a sonic synthesis transposed onto the temporal scale of the work. Some of his pieces are very explicit on this point, such as his two last electronic pieces, composed with the GENDYN program, *Gendy3* (1991) and *S.709* (1994). An algorithm synthesises the sound continuously, using probabilistic variations of its pressure curve. There is thus no difference, strictly speaking, between synthesis (of sound) and composition (in the traditional sense): in theory, composition is the direct result of synthesis – in Xenakis's conceptual language, *macrocomposition* results from *microcomposition* (cf. Xenakis 1981). The granular concept of sound that Xenakis developed in the late 1950s is also very revealing. Lacking the means to put granular synthesis into practice at the time, he proposed the hypothesis of a "second order sonority" (Xenakis 1992, 103) and composed *Analogique A and B* (1958-1959) to test it: the nine string instruments play only isolated sounds (short arco notes, pizzicati or battuti col legno) and the tape (*Analogique B*) is made with clouds of very short sinusoidal sounds; these isolated instrumental sounds and these sinusoidal sounds represent the *grains of sound* and Xenakis hopes that the ear will fuse them and hear an overall sound (cf. Di Scipio 1999). This hypothesis implies that composition (of the whole work) is a synthesis (of sound) on a higher level.

The compositions discussed here represent exceptions in Xenakis's oeuvre. In general, his work does not consist of a macrocomposition taken, unmediated, from the microcomposition, or of compositions that simply transpose a sound synthesis, not least because most of his oeuvre (in quantitative terms) is instrumental and therefore does not draw on synthesis or microcomposition. It can nevertheless be demonstrated that a large proportion of his music can easily be analysed as

composed sounds. One simply needs to replace the word *sound* with *sonority*, in order to indicate that the composed object in question is not sound in the physical sense of the word, but a more complex entity, for example the whole section of an orchestral work.

The beginning of *Jonchaies* (1977) is a good example, between bars 10 and 62, where the strings play (with a few percussion instruments). This passage forms a long, almost monolithic section, with a very clear gradual interior evolution, just like the evolution of a single sound. The strings are divided into eighteen parts, played by one or two instruments. Despite lasting for a long time, the trajectory is very sustained, and schematic enough for the ear to follow from start to finish, as the eye would follow a visual outline of the piece (cf. the transcription in the form of a graph given in Harley 2004, 73). Furthermore, the whole passage is based on a single sieve, or scale (which, according to Xenakis, is drawn from the *pelog* scale: cf. Xenakis in Varga 1996, 162). But the key element is not the scale itself, as a series of pitches. Pitch is not a principle characteristic here: given that it is stretched out over a piece that lasts for such a long time, that it is explored patiently over its whole range in such a linear way, and that it is placed within the gigantic sound halo produced by the technique of heterophony, we can conclude that the sieve is used for its colour. To sum up, we can see this passage as a single sound that gradually unfurls, and whose internal composition and temporal evolution we can examine as if under a microscope and in slow motion.

As we know, Xenakis often used graph paper to "draw" his music and create plastic forms, a method that reinforces the spatial aspect of evolution in time and, thus, the sound dimension itself. One striking and well-known example is that of bars 52-59 of *Pithoprakta*: for these few bars, he used Gauss's law to calculate over a thousand *speeds*, or glissandi (1142, according to the historic article in *Gravesaner Blätter*: Xenakis 1956, 31; 1148 according to *Musiques formelles*: Xenakis 1963, 30 – English translation: Xenakis 1992, 15; 1146 according to my own count). However, these glissandi are distributed over time thanks to a famous graph, of which two versions exist (cf. Gibson 1994). The overall result – the sonority – is, according to Xenakis's own comments, "a plastic modulation of the sonic material" (Xenakis 1956, 31, our translation), and, we could add, a modulation resulting directly from the form of the graph. There are in fact two versions of the article in which Xenakis makes this statement (as we have already seen in relation to the differing counts of glissandi). In the older one he states that "the distribution [of the speeds: that is, the calculation of their values] is Gaussian, but the geometric form [that is, their positioning using the graph] is a plastic modulation of the sonic material" (Xenakis 1956, our translation). This is the hypothesis adopted here. In the second article he writes: "the distribution being Gaussian, the macroscopic configuration is a plastic modulation of the sonic material" (Xenakis 1992, 15), which implies that the graph is drawn from the calculation.

There are many other works in which Xenakis uses graphs to develop linear glissandi, Brownian movement, *arborescences*, etc. Whether composed with or without graphs, most of Xenakis's works can be analysed as successions of sonorities, that is, as sections that we listen to as composed sounds. The arrangement (the shape) can be decided according to a logic of process composition, a dramatic evolution, or another method. It is important to remember that the approach proposed here does not claim to be exclusive. Listening to a work by Xenakis as a series of composed sounds, or of sonorities, does not mean that one cannot also hear its rhythmic or dramatic qualities, or take an interest in questions of formalisation and mathematics.

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Bibliography:

Di Scipio, Agostino. 1999. “The Problem of 2nd-Order Sonorities in Xenakis' Electroacoustic Music.” *Organised Sound* 2 (3): 165-178.

Gibson, Benoît. 1994. “La théorie et l’œuvre chez Xenakis : éléments pour une réflexion.” *Circuits* 5 (2): 42-46.

Harley, James. 2004. *Xenakis. His Life in Music*. New York: Routledge.

Hoffmann, Peter. 2009. “Music Out of Nothing? A Rigorous Approach to Algorithmic Composition by Iannis Xenakis.” PhD diss. Berlin: Technischen Universität Berlin.

Solomos, Makis. 2019. *From Music to Sound. The Emergence of Sound in 20th- and 21st-Century Music*. London: Routledge.

Varga, Bálint A. 1996. *Conversations with Iannis Xenakis*. London: Faber and Faber.

Xenakis, Iannis. 1956. “Wahrscheinlichkeitstheorie und Musik.” *Gravesaner Blätter* 6: 28-34.

Xenakis, Iannis. 1963. *Musiques formelles. Nouveaux principes formels de composition musicale. La revue musicale* n°253-254. Paris: Richard-Masse.

Xenakis, Iannis. 1981. “Les chemins de la composition musicale.” In Xenakis, Iannis. 1994. *Kéleütha*, texts compiled by Alain Galliari, preface and notes by Benoît Gibson, 15-38. Paris: L’Arche.

Xenakis, Iannis. 1992. *Formalized Music: Thought and Mathematics in Composition*, revised edition, additional material compiled and edited by Sharon Kanach. Stuyvesant (NY): Pendragon Press.