Sonority and Proportionality in Xenakis's Dikhthas

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Introduction

The notion of randomness is frequently met in the music of Xenakis. As he would deny improvisation (see Varga, 1996: 55), randomness was for him related to the principle of causality and determinism in the compositional procedure. The fact that now we have discovered how to separate, for example, chance in different degrees, provided us with a tool in order to organize the idea of randomness, which we can manipulate it [chance, randomness], if not to define it (see Xenakis, 1992: 4). The question of systematizing the process of making music is an essential problem of the orchestrator’s extreme – in order to create mass events was explored in his second major orchestral work Pithoprakta (1955–6), where he mainly used Maxwell and Boltzmann’s kinetic theory of gases (see Solomos, 2001: 245). He rejected Fourier analysis that expresses sound as summation of sinusoidal components of frequencies that are multiples of the fundamental frequency of the sound. Instead he proposed the inverse: ‘we wish to construct sounds with continuous variations that are not made out of unit elements. This method would use stochastic variations of the sound pressure directly’ (Xenakis 1992: 246). By unit elements he means the sine functions that are piled up to compose the sound. He would substitute them by variations of the pressure curve directly, which is now our start and our stopping point. He used the metaphor of a particle moving capriciously according to Brownian movement (random walk) theory. However, at that time Xenakis did not compose any electroacoustic works using this method. This is probably because the technologic means available to him were not powerful enough (see Solomos 2001: 246–7). What he did was to transfer this experience with electronic means to instrumen-tation. This first work he composed this way is Mikron (1971, for solo violin), which consists of continuous glissandi without vibrato – an austere metaphoric of a random walk.

Arborescences

For a great part of the 1970s Xenakis would use material derived from Brownian movement, which eventually evolved and appeared in various forms in his works. He was interested in achieving continuity – continuous variation and continuous transformation. In this he practised the composition by using several Brownian-movement lines simultaneously, starting from a common source resulting to a tree-like expansion that he called ‘arborescence’. He firstly used this method in Evryali, his second solo piano piece composed in 1973. In it we can see, in a synoptic view, how the work is structured according to sections of certain sonorities. In terms of temporal proportions, section 3 with the Brownian movements is the most prominent. We have already seen how significant the role of this sonority is to the work. This section is positioned not in the middle of the work, so as to re-inforce it in a symmetric division, but we see that the same schema for the temporal proportions of the sonorities in the sections, also holds for the structure of the work as a whole, namely the golden section proportion. The golden section of the central section 3 coincides with the one of the composition as a whole. This point is found at the point where the third sub-type of the Brownian movement (m. 98). Furthermore and as a logical consequence, the temporal proportion of the music before and after section 3 is the golden ratio as well (311/190). So, if the duration of the whole work is AB, the duration of section 3 and section 1/2 of each of their common golden section points, is the temporal proportions in Dikhthas can be expressed by the following expression:

\[
\frac{A}{B} = \frac{311}{190} = \frac{33}{20}
\]

The question arises whether this arrangement was intended by the composer or not. In an interview said that such a result is not necessarily intentional: ‘Musicologists may analyse scores and come up with their conclusions – and they may be perfectly right – but their findings need not indicate anything conscious on my part’ (Varga 1996: 204).

References


Brownian movement

Stochastic material

Hold note (CA)

Figure 1. Arborescences in mm. 5–4 and pp. 3–2 of Dikhthas.

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Figure 2. Brownian Movement in mm. 29–30.

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