

# Silence in time continuum as a stochastic process in Iannis Xenakis's instrumental work

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## Abstract

Silence acquired a functional role in the musical avant-garde dialectics during 1950-60. Until recently, the use of silence through implicit organizational procedures in Xenakis's instrumental music remained totally unknown. Nevertheless, the data in *Xenakis Archives* that are accessible nowadays permit us novel ways to contextualize silence in his work. This contextualization based on mathematical models and graphics goes beyond known research areas.

*Pithoprakta* (1956) is a nodal work in Xenakis's production and contemporary music as well. This work outlines the overall composition planning, which is mainly realized through Cartesian graphs. In these graphs ordinate and abscissa denote time and pitch height respectively. The partition of time continuum, that is the distribution of sound events' differential durations on the time x-axis, is governed by the probability  $P$ , which is computed via density  $\delta$  (maximum number of events in a measure), number of time units  $x$  and step of displacement  $dx$  in the equation  $P = \delta \cdot e^{-\delta x} \cdot dx$ . Silence, then, is a lack of sound events that is a product of event formalization based on the probabilistic computation already discussed. Thus, there are two kinds of silence: a) rests with no required formalization that are graphically assigned to an instrumental line or to a number of lines, as in measures 45-51, and b) rests deriving from previous event formalization that are assembled in specific sets and distributed among existing events according to a new formalizing process, as in measures 16-41.

This paper shows that Xenakis did not use rests as an uncontrolled void of sound. Instead, he incorporates silence in the time flow via stochastic distribution throughout sonorities using graphic planning and formalization. The return of musicological research to formalization questions makes silence a regulating agent of the course of composition in Xenakis's works.

## CV

Born in Athens, 1958. PhD in systematic-analytical musicology of the avant-garde (Sorbonne-Paris 4 University). Graduate in Pedagogical Studies (University of Athens). Composer. Researcher/tutor of systematic musicology in Aristotle University of Thessaloniki. Author of: *From Tonal to Contemporary Music Theory*, Studies and articles on the Ancient Greek Musical Civilisation, on Xenakis's compositional procedures. Associated researcher to the *Rirra 21* music research team (Paul Valéry – Montpellier 3 University). Scientific ex-collaborator of the National Pedagogical Institute. Producer of Μούσα Πολύτροπος radio program (Greek National Radio 3). Accredited music professor and instructor (National Centre of Accreditation – EU). Scientific in charge of the *2nd Tribute to Iannis Xenakis* (National Museum of Contemporary Art). Teacher in Music Theory since 1986. Member of the Greek Composers Union (GCU).