

Play and game in *Duel* and *Strategy*

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The mathematical Game Theory is the theoretical background to three of Iannis Xenakis' compositions: *Duel* (1959), *Stratégie* (1962) and *Linaia Agon* (1972). The first two works oppose two orchestras, or more precise two conductors, in a musical combat, they differ in the size of the orchestras (*Duel* for two fifty-six musician's orchestra, *Stratégie* for eighty-two) and the tactics (musical material) the opponents are aloud to use. Naturally, the payoff matrices, which direct the opponent's choice, are different in both works. *Linaia Agon*, for horn, trombone and tuba, is a later work, combining completely determined parts with improvised combats. Having already treated this chamber piece [Sluchin 2005], this article will concentrate on the earlier works.

The research contained in this proposal is musicological, historical and practical.

1. Musicological

An extensive study of the Composer's writings in relationship of Game Theory is the start point. The main source: *Musiques Formelles* [Xenakis 1981] and the third chapter "Stratégie Musicale" is carefully studied, in the light of period articles and books that had oriented Xenakis to use this branch of Mathematics in his compositions. The original material conserved in the Bibliothèque nationale de France, is a new source of information for these neglected part of his output.

2. Historical

Both pieces had a short experience in performances. *Duel* was not performed before 1971, and *Stratégie* gave rise to a musical scandal in the concert in Paris that followed the Venice Biennale concert with Maderna and Simonovich [Matossian 1990]. From the other part, the composer was not entirely satisfied with these concerts. The reception to this works from both the public and the orchestral musicians show, that the controversy towards indeterminate works, played an important part with this works.

3. Practical

The musical combats follow the rules given by the composer. A row or a column is a tactic, and correspond to a musical part in the score. The conductors choose each their move, and the numerical 'value' is determined by the payoff matrices entry. The aim of the game is to win a maximum amount of points. It is extremely hard, to follow the opponents choices, to make his own move watching the matrices' values, and to transmit the players the tactic chosen to be played. Xenakis gave a detailed description for an installation, to help the communication between the conductor and his orchestra [Xenakis 1959]. Studying in detail his description, we propose a CAP (Computer Aided Performance) [Sluchin&Malt 2010] Interface to inhance a spontaneous execution in concert, completely based on IX conception of the work.

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Benny Sluchin studied music at the conservatory of his native city, Tel Aviv, and in the Academy of Music in Jerusalem. Simultaneously, he studied mathematics and philosophy at the university of Tel Aviv and received his "Master of Science". Since 1976, he has been a member of the Ensemble InterContemporain (directed by Pierre Boulez), playing the most representative music of the present century, and participating as soloist in premières of solo works by Iannis Xenakis, Vinko Globokar, Gérard Grisey, Pascal Dusapin, Elliott Carter, Luca Francesconi, Marco Stroppa, and others. Apart from this, he participates in various research projects in brass acoustics at IRCAM (Institut de Recherche et de Coordination Acoustique/Musique), Paris. He finished his doctoral thesis and is the author of many articles and pedagogical books. The SACEM prize for the pedagogical realisation was given in 1996 to his Introduction to contemporary trombone techniques and Singing and playing simultaneously on brass instruments (Éditions Musicales Européennes). Benny Sluchin has taken part in many recordings and completed "Le Trombone Contemporain", Musidisc, "French Bel canto Trombone", Musidisc and Xenakis - Keren (Erato).

Mikhail Malt started out his musical career in Brazil as both flutist and orchestral conductor, having conducting youth orchestras for ten years. He is researcher at MINT-OMF Sorbonne Paris IV (« Musicologie, informatique et nouvelles technologies » Team, as branch of the "Observatoire Musical Français"). At Ircam, he is "Computer Music Designer", and on charge of teaching Computer Assisted composition and musical synthesis, within the Educational Department. He is currently pursuing his composition and research activities in the fields of artificial life models, musical representation and compositional epistemology.