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Numerussonorus: Using Max/MSP to Explore the Compositional Potential of Number Sequences and Deterministic Algorithms

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Abstract

The concept of *numerussonorus* or “sounding number,” a term borrowed from Renaissance music theorist Zarlino, is appropriated here to refer to a pedagogical approach to the fundamental techniques of algorithmic music composition. Following a brief historical introduction, the terms algorithm and algorithmic composition are carefully defined, and the concept of a compositional formalism is introduced. Composer and theorist Otto Laske notes that algorithmic composition is often characterized by a parametric conceptual framework, that is, a view of the musical surface and performance in terms of the perceptual parameters of sound. Within such a conceptual framework, the compositional process might be viewed as the ranking of perceptual parameters such as pitch, intensity, duration and timbre. Algorithms are used to establish an isomorphism, or mapping, between number sequences and these perceptual parameters. In this central part of the creative process of algorithmic composition, musical results are typically generated and then accepted or rejected based on their usefulness to the composer. A variety of number sequences and deterministic algorithms are explored in this paper. Each step of the mapping process is examined using custom software applications written in Cycling ‘74’s Max/MSP, a musical programming environment. These applications allow users to freely investigate the mapping process. Applications include historical examples like Guido D’Arezzo’s text setting method (c. 1026), as well as more contemporary examples, such as musical mappings involving Messaien’s communicable language, Barnsley’s chaos game, the logistic difference equation, and the decimal expansion of the number π .

The Web site for this presentation is available at

www.music.sc.edu/fs/bain/atmi03/

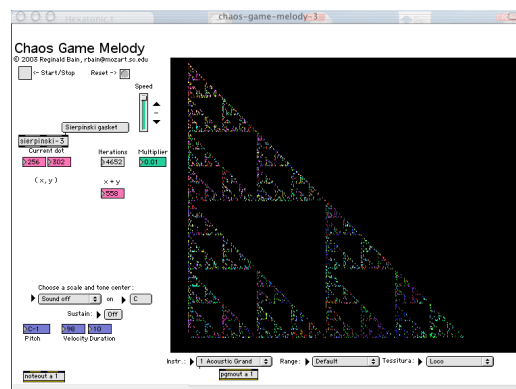


Fig. 1. The *Chaos Game Melody* application—a musical version of Barnsley’s chaos game.

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Woodcut from Franchino Gafurio's *Theorica musica* (1492).