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**Godfried T. Toussaint\*** (godfried@cs.mcgill.ca), Department of Music, Music Building, North Yard, Harvard University, Cambridge, MA 02138. *Mathematical Property-Preserving Shellings of Musical Rhythms*. Preliminary report.

In its simplest form, a musical rhythm may be represented as a binary sequence of unit time pulses, in which one symbol represents a sounded pulse, and the other a silent pulse. For example, the world-renown 16-pulse “clave son” rhythm would thus be notated by the sequence  $[x \ . \ . \ x \ . \ . \ x \ . \ . \ . \ x \ . \ x \ . \ . \ .]$ , where  $x$  denotes the sounded pulse. The mathematical operation of shelling a rhythm consists of replacing a pulse of one kind with a pulse of the other kind. The minimalist composer Steve Reich, who made use of rhythmic shelling in some of his compositions, called these operations, construction and reduction, respectively. For example, the “shave and a haircut, two bits” rhythm  $[x \ . \ x \ x \ x \ . \ x \ . \ . \ . \ x \ . \ . \ . \ .]$  is a 2-step construction of the clave son, whereas the rhythm  $[x \ . \ . \ x \ . \ . \ x \ . \ . \ . \ . \ x \ . \ . \ . \ . \ .]$  is a 1-step reduction of the clave son. It is well known that “good” rhythms sometimes possess certain mathematical properties such as maximal evenness, deepness, flatness, full-interval-content, and symmetry. This paper analyzes some families of rhythms that exhibit such property-preserving shellings. For instance, it is shown that the beginning and ending portions of Steve Reich’s piece “Drumming” are characterized by symmetry-preserving shellings. (Received August 08, 2010)