

I. SOLVING THE EQUATION OF LIFE IN MUSIC:

$$\text{MUSICAL SCORE} + \text{MICROSTRUCTURE} = \text{LIVING MUSIC}$$

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Much of the living qualities of music are imparted in performances by the pulse and by the customized shaping of the amplitude contour of each individual tone. The dynamic nature of each of these microstructure functions as part of musical thought (Clynes 1983, a, b, c) has been incorporated into a computer program. The pulse, distinct for each composer and for various types of music, specifically influences each tone both in amplitude and duration in a manner given by the pulse matrix. Previously this has been determined for Beethoven, Mozart and Schubert. We shall now be demonstrating this for the music of Bach. Hierarchical organizations of pulse structure will be shown. In all cases, the computer calculates the microscore from the pulse parameters and from the base shape values introduced by the interpreter, and performs the piece in real time.

Earlier work had established these functions using sinusoidal tones only, deliberately omitting timbre and vibrato in order to study the subtle effects of timing and amplitude shaping without extraneous variables. We can presently include also timbre and timbre variations within each tone as part of the computer program. Variations of timbre within each tone are controlled by the same Beta functions as are used in the calculation of the amplitude shape with appropriate dynamic shape transformations, thereby saving computer time. Our PDP-11-73 computer program is able to play with authentic expression in real time four independently modulated voices, including pulse and amplitude shape functions. A version of the program suitable for personal computers is being prepared.

Special rules are also being developed that can apply vibrato differentially to the various tones of the melody, controlling the portion of each tone over which the vibrato is applied, as well as the dynamic shape of the vibrato frequencies and depth envelopes, as a function of melodic structure. This highlights the differences between a musically "natural" vibrato, a "varnish" like mechanical vibrato, and stylistically revolting use of vibrato.

Complete computer performances of music of Bach including Preludes and Fugues from the Welltempered Clavier, movements of Suites for Violin and Cello, as well as examples of Jazz (Thelonius Monk) and other music will be given at the scheduled time as announced.

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CLYNES, M. (ed.) (1982): Music, Mind, and Brain: The Neuropsychology of Music, Plenum Press, N.Y., pps 435.