Douglas C. Wadle

Systema

(Cognitive Disjunction, proper)

version with linear distortion

violin, viola, cello

PLAINSOUND MUSIC EDITION

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version with linear distortion

violin, viola, cello

NOTES for performers

A version of *Systema* will be generated by selecting, first, an interval that will serve as the "frame" for the realization. Just intervals projected onto this "frame", rather than onto the octave, via "applied ratios" are stacked successively in as the violin and cello fan out from the (mid)point, G4, (a perfect fifth above middle C).

Four "applied ratios" at the specified frame are to be calculated by the following formulas, where "A" is the "applied ratio" and "F" is the "frame":

$A^1 = (F - 1)(1/6) + 1$
$A^2 = (F - 1)(1/8) + 1$
$A^3 = (F - 1)(1/14) + 1$
$A^4 = (F - 1)(1/15) + 1$

The next step is the calculation of frequency ratios defining the specific pitches for the violin and cello parts in reference to the beginning G, designated with the ratio 1/1. For the violin part, each pitch-determining frequency ratio, "P" is determined through the following sequence:

$P^1 = (1/1)(A^2)$
$P^2 = (I^1)(A^4)$
$P^3 = (I^2)(A^3)$
$P^4 = (I^3)(A^1)$
$P^5 = (I^4)(A^4)$
$P^6 = (I^5)(A^3)$
$P^7 = (I^6)(A^1)$

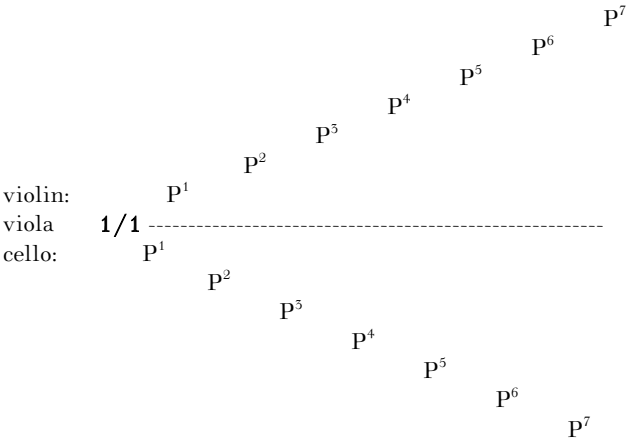
For the cello part, each pitch-determining frequency ratio, "P" is determined through the following sequence:

$P^1 = (1/1)(1/A^1)$
$P^2 = (I^1)(1/A^3)$
$P^3 = (I^2)(1/A^4)$
$P^4 = (I^3)(1/A^1)$
$P^5 = (I^4)(1/A^3)$
$P^6 = (I^5)(1/A^4)$
$P^7 = (I^6)(1/A^2)$

The distance of the resulting "applied ratios", in cents (1/100 of an equal-tempered semitone), from the beginning G is to be calculated by the formula:

$1200*\log(A)/\log(2)$

The outline of the realization is to be constructed according to the following diagram:



The duration between successive introductions of these pitches should be approximately equal, and each pitch is to be sustained at least until the next successive pitch is established. The beginning G is to be sustained throughout the piece (primarily, though not necessarily exclusively, by the viola).

The realization should be constructed in such a way that it can be performed by ear. As such, intervening pitches (in any voice) may be required to facilitate the tuning of certain primary pitches (determined through the calculations above). Wherever possible, these intervening pitches should lie between the extremes of register then sounding in the violin and cello. The frequency relationship between two pitches may be calculated by dividing the smaller ratio into the larger. The size of the resulting interval in cents may be calculated by the formula given above. Note: As a general rule, frequency ratios involving higher numbers, and particular possessing higher prime number factors, are harder to tune[1]. Where no workable solution to the tuning of some primary pitch can be found, a judicious use of scordatura may be necessary.

Douglas C. Wadle
28 March, 2008
Los Angeles

A sample realization at the 3/1 "frame" is provided. This realization requires a retuning of the violin D-string to D-flat +3¢ (a frequency relation of 17/12 in reference to G). The cello D-string is to be tuned to C-sharp +8¢ (a frequency relation of 99225/73984 in reference to G).

[1] A catalog of frequency ratios tunable by ear was compiled by Marc Sabat and Wolfgang von Schweinitz. The intervals included are, in order of increasing size: 1/1 (unison), 8/7, 7/6, 6/5 (just minor third), 11/9, 5/4 (just major third), 9/7, 13/10, 4/3, 11/8, 7/5, 10/7, 13/9, 16/11, 3/2 (just perfect fifth), 14/9, 11/7, 8/5 (just minor sixth), 13/8, 5/3 (just major sixth), 12/7. 7/4, 9/5, 11/6, 13/7, 15/8, 23/12, 2/1 (octave), 13/6, 11/5, 9/4 (just major ninth), 7/3, 19/8, 12/5, 17/7, 5/2, 18/7, 13/5, 8/3, 11/4, 14/5, 17/6, 20/7, 23/8, 3/1.

SYSTEMA

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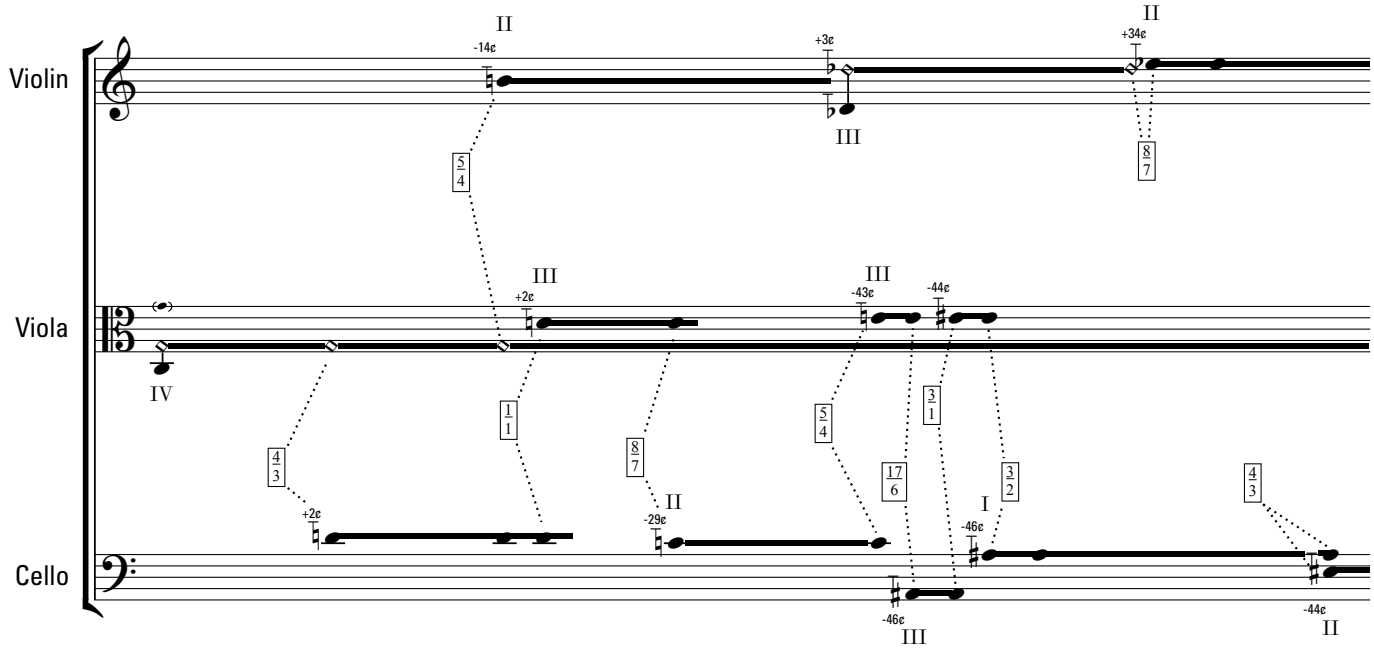
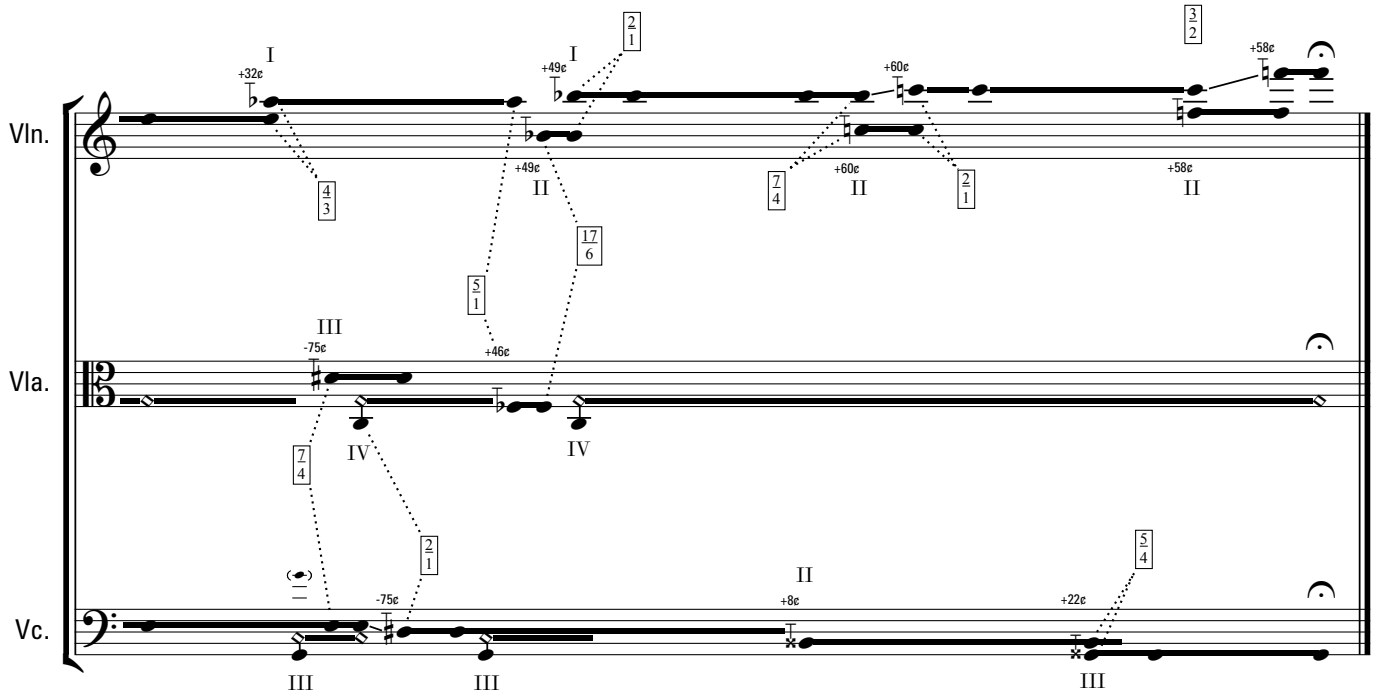
D. C. Wadle

Realization at the 3:1 Frame





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