



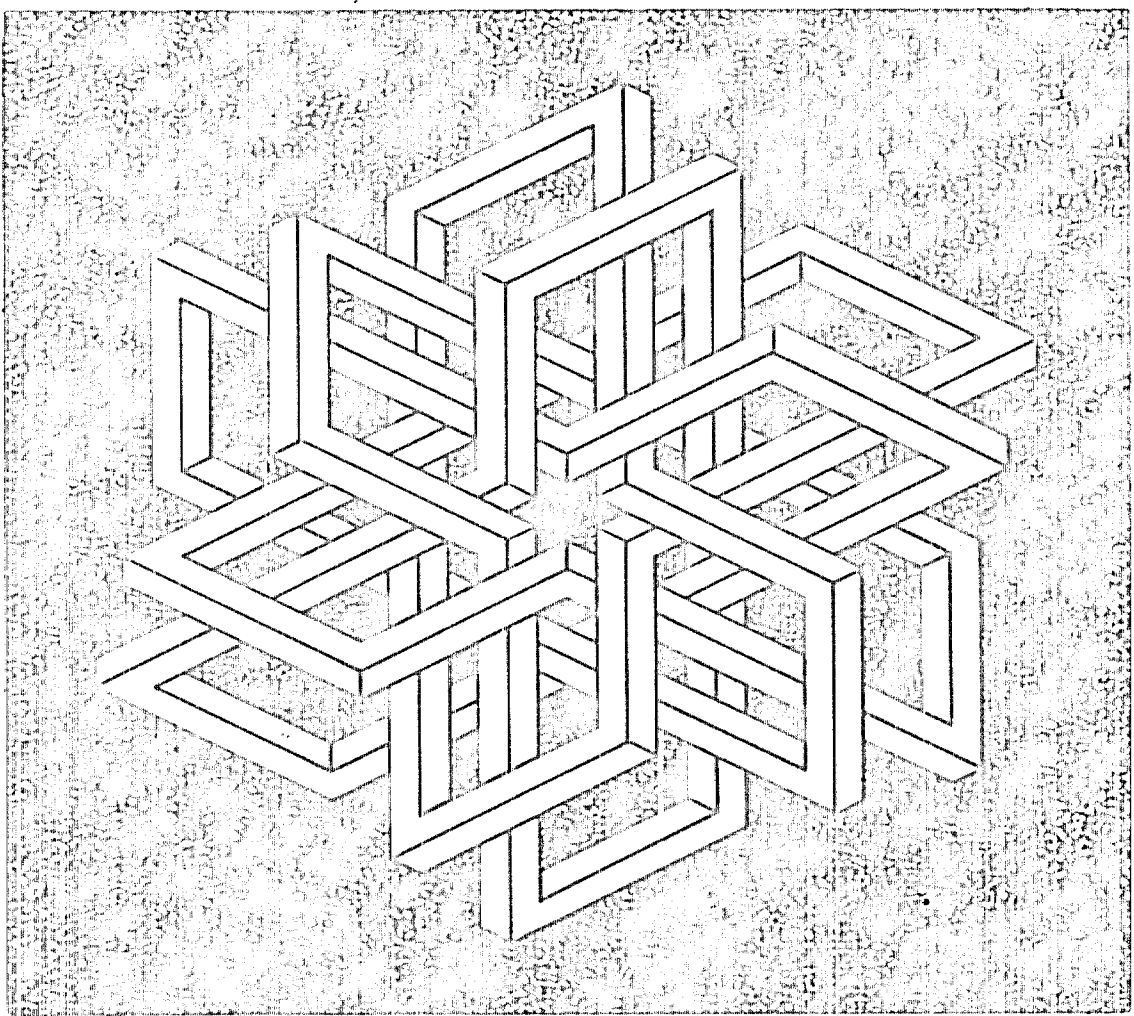
Symmetry: Culture and Science

SYMPOSIUM
Symmetry of Patterns

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POSSIBILITIES OF SYMMETRY IN MUSIC

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The interdisciplinary phenomenon of symmetry is indispensable in music, having a diversity of roles. Symmetry in the structure or form construction of music is easy to recognize, especially when the constituting sections are long enough. An apt example is the bridge form (a term first applied by Bartók to a musical form). The composition is schematized by letters in the following way: A B C D C B A, or A B C D E D C B A. The segments labelled by different letters have distinctly different character and when they return, the listener recognizes them. Memory plays a significant role in the perception of temporal symmetry: the no longer unknown musical material is recognized when heard again.

Just as the duration of whole compositions, the length of the lettered sections also widely vary.

When the notes return in reverse order, we get a *retrograde* (crab) statement. The perception (recognition) of such a musical idea required a trained ear.

In this case the symmetry of the form is a melodic formation. Another variant of melodic symmetry is the *inversion* when an ascending interval is echoed by a symmetrically descending one. Such *mirror* images reflected across the horizontal axis are most easily recognized when the two figures sound together, producing a kind of funnel:

< or > , or successively < > or > < .

When sounded in a successive order, they can most easily be followed in homophonic musical cultures; for example, the line of a question patterned by a melodic outline, followed - not necessarily immediately after it - by its mirror inversion, produces the following curves:



When this kind of movement involves passages of intervals or chords instead of a unison melody, the result is harmonic symmetry.

Particularly interesting are the chords of identical intervals, whose meaning has been fixed over the time of history. The chord built of four minor thirds - the diminished seventh - was the tool for the expression of the greatest tension in the Baroque age. The equal division of the octave in three parts produces the augmented triad which gives the impression of floating, especially in symbolic-impressionistic trends around the turn of the century.

In essentials, the whole-tone scale (or sounded simultaneously: the six-tone chord) belongs here: its major seconds are produced by halving the intervals of the augmented triad. Halving again, the resultant intervals lead to the smallest components of the dodecapronic system: i.e. to the minor seconds (and the chromatic scale). This set of notes was most singularly exploited by the three composers of the "second Viennese school" (Schoenberg, Berg and Webern); in their serial works (composed with the help of the *Zwölftontechnik*) all the

tones are equal in significance. This principle resulted in the disappearance of the traditional sense of tonality. The basic row (*Reihe*) of a composition in this style (using each tone once in a predetermined sequence) may assume four shapes which produce symmetric structures. Designated by numbers, the "basic" row reads:

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12.

The retrograde statement of the numeric series is:

12, 11, 10, 9, 8, 7, 6, 5, 4, 3, 2, 1.

When mirrored across the horizontal axis, they take on the form of:

1, 5, 9, 13, 17, 21, 25, 29, 33, 37, 41, 45.

The retrograde of this inverted form is:

45, 41, 37, 33, 29, 25, 21, 17, 13, 9, 5, 1.

Nevertheless, not only serial music is characterized by symmetric formulae; they can also be found in the whole or in parts of compositions belonging to other stylistic trends.

Symmetric relations have a structural significance even if they are not among a work's "audible", i.e. easily recognizable features. Rhythm largely facilitates recognition: a musical material returning with the same rhythm is more immediately recognized, since a change of rhythm also implies a change in character (the expression of anti-symmetric characters).

THE LITTLE PIANIST AND SYMMETRY

Symmetrical Structures in the Works of New Hungarian Composers

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In 20th century piano teaching it has become a goal to develop the beginners' familiarity with the entire keyboard as soon as possible. They should not only play the central octaves that are easy to read, but use as much of the available tone set as possible. In this way, the little pianist will be "at home" in every register of the keyboard already at the beginning of his studies. When practising the whole range of notes, the playing of symmetrical structures - the use of both hands in the same function - is of great help.

Bartók's "Microcosmos" and as its continuation, György Kurtág's cycle "Plays & Games" offer fine examples. One can find clues to the solution of similar methodological problems in certain works of other contemporary composers as well.

Static and dynamic forms of symmetry can be learnt on the piano during the workshop.

Kurtág, György

Perpetuum mobile (objet trouvé)

Vivace, ma sempre tranquillo

sempre con Ped.

(repet. ad lib.)

pp molto

subff

sff