

3. *Phantasmagoria and Mathematics*

M: As in works preceding and following MIKROPHONIE II – for example, KLAVIER-STÜCK IX / PIANO PIECE IX (1961), ADIEU (1966), TELEMUSIK / TELEMUSIC (1966),¹⁸ Stockhausen used the Fibonacci series to determine the durations of the 33 Moments. The Fibonacci series is attributed to the mathematician Leonardo Fibonacci of Pisa. In the first half of the 13th century, Fibonacci belonged to the circle of scholars at the court of Emperor Friedrich II in Palermo. He was the first to formulate the law of a numerical series in which, beginning with 0 and 1, each number is the sum of the two preceding numbers. The basic form of this series is: 0 1 1 2 3 5 8 13 21 34 55 89 144 etc. 0 plus 1 = 1, 1 + 1 = 2, 1 + 2 = 3, 2 + 3 = 5, 3 + 5 = 8, 5 + 8 = 13, etc. It's that simple and elegant, and not at all banal when one considers the fact that this same crescendo of numbers can be found everywhere in nature as a basic principle of construction. For example, Kepler discovered that the leaves of some plants are distributed around the stalk in the form of a spiral that conforms to the Fibonacci series: this allows for an optimal distribution of sunlight on all parts of the plant. For Stockhausen the spiral is very significant: one of his pieces is even entitled SPIRAL.¹⁹ In MIKROPHONIE II he takes the durations of all 33 moments from the Fibonacci series. The range is from 3 to 144 seconds.²⁰ The series is even involved in the number 33, i.e. in the number of moments. The sum 33 is arrived at by coupling the Fibonacci series with the series 1 2 3 4 5 6 8 2 2. The Fibonacci series is, read backwards, projected onto this second series. Thus there is one moment which has a duration of 144 seconds, two which have a duration of 89 seconds, three of 55 seconds, etc.

L: That makes a total of 33 moments; I've already added it up. But it's not clear why there is no 7 and then, at the end, two 2s.

M: The distribution of these durations follows rules that I can't go into here. The proximity of the Fibonacci series to the addition and subtraction phenomena of ring modulation may have motivated its usage just as much as its proximity to the proportional law of the golden section. (The golden section is produced by dividing a length such that the shorter part relates to the longer as the longer part relates to the whole.) Through use of the Fibonacci series the golden section seems to be operative in the microstructure of the composition; in the technique of text distribution we can detect the sum and difference principles of ring modulation.

Out of context, the procedures of serial distribution appear to be pretty tedious. However, they have an important function in the musical context and its particular "time". The guiding principle behind the rearrangement of the text in the succession of 33 moments is simultaneity. All zones of the text are equally present during the entire course of the work. The musical

18 Cf. Jonathan Kramer, "The Fibonacci Series in Twentieth-Century Music", in *Journal of Music Theory* 17 (1973), pp. 110–148; esp. pp. 121–126; Kramer does not treat MIKROPHONIE II.

19 Cf. Jill Purce, "La Spirale dans la musique de Stockhausen", in *Musique en jeu* 15 (1974), pp. 7–23.

20 The standard unit chosen for this version is $\frac{1}{60}$ min. (1 sec.)

II. The Ring-Modulated Meditation

space-time generated by the composition enters into the presence of the text as a whole in order to lay claim to its parts through recollection and prediction. In this way the imagery of the text, its imaginary simultaneity, is again reflected in the temporal succession of the piece. Perhaps one can already see in this a foreshadowing of the formula technique of MANTRA.

Moment 1 and Moment 2 give the signal for the temporal omnipresence of the text: The first line, “the shadow I am casting is the shadow I am casting”, is sung simultaneously with the heading “participial”, which characterizes the syntactical procedures of the final section of the text, “f”. This is immediately followed by the first line of the third section. It is to be whispered in normal speech rhythm while the first ‘time window’ – a memory – is opened. “To the middle of half-way” – this absurd tautology is similar to the spatial impression conveyed by the solo soprano in MOMENTE: “Everything surrounding me is near and far at once.” The ring-modulated meditation of MIKROPHONIE II wraps itself like a spiral around Heissenbüttel’s text, whose original shape is both absent and omnipresent as in no other vocal work.

[On the following page, the first page of the score of MICROPHONY II with Moment 1 and Moment 2 is reproduced. One can see the type-faces chosen by Stockhausen to characterise the different texts and instructions for the choir groups throughout the score:

Choir groups: **SI** (Sopranos I), **BI+II** (Basses I + II), **ALL** etc.

Practical instructions: **conduct**, **these indications stem from ...**, **TAPE** etc.

Principal temporal indications: **SYNCHRON.** etc.

Relative temporal indications: **const.**(ant), **fast**, **in normal speech rhythm**, **short** etc.

Temporal modes: **contin.**(uous), **vibr.**(ato), **accel.**(erando), **ad lib.**(itum) etc.

Performance characterisations: **timbre changes**, **always on fundamental**, **solemn** **Levite chant** etc.

Heissenbüttel text: **the shā - dow | am cā - sting** etc. (ā = stressed).]

MIKROPHONIE II

Karlheinz Stockhausen

conduct 51 *

no whispered syllables

1

confia., tremor; chorus, always on fundamental

cond.

SI *SYNCHRON./ fast*

solzen Geste dinst

the shō - dow / an cō - sting is the shō - dow / an co - sting

SII

SYNCHRON./ deep-voiced speech, different inflections

short syllables

neerl - - - - -

ner - si - si - si - si

2

confia./ sbr./ extremely high (2')

cluster 2 set. -----

cond.

ALL SYNCHRON./ whisper

in normal speech rhythm

to the mid - die of half - way

f

ad lib.
syllables to be completely intelligible

* these indications stem from the first performance; when more are given, 1 singer in each group conducts **SYNCHRON.**

TAPE *Gezang der Jünglinge*

from 1'1-5" (slow) to 1'11-5" (fast)

(in track V from: preist den Herren, preist ihn)

start ← c. 3" before **2** → c. 4" more

Holy Seriousness in the Play

Illustration 49: Moments 1 and 2.

L: As to Heissenbüttel: doesn't his mathematical text construction provide the best reference point for Stockhausen's use of the Fibonacci series as a proportional principle? Nonetheless I would be hard put to identify it in the *Simple Grammatical Meditations*.

M: At the beginning we saw that Stockhausen does not comment on this text and is also silent on the subject of any possible affinity to Heissenbüttel's literary work. Why don't we let one of his colleagues speak for him? Hans Ulrich Lehmann, in an essay on his composition *Heissenbüttel-Rondo* (1965), explains his preference for "setting" texts of Heissenbüttel. The contemporaneity of author and composer is for him a first, important criterion. For both artists the fundamental question as to how to go on is posed with the same urgency. And both seek, by means of experimental, exploratory techniques, to arrive at the boundaries of a no-man's-land in order to find "that which cannot yet be said".²¹ Lehmann sees the mathematical organization of Heissenbüttel's texts as the most important argument:

A close relationship to music results from the fact that Heissenbüttel's texts are frequently characterized by extensive structuring. I believe that I can demonstrate this conclusively for individual texts. It can be shown more easily and quickly in external features such as titles:

"13X13 quasiautobiographical poem" (consisting of 13 sections of 13 lines each), "3X13 more or less stories". Beside the number 13 – "Verallgemeinerungen" (Generalizations), "Pamphlete" (Pamphlets), "Sprech-Wörter" (Pro-Verbs) have 13 texts each, "Rücksprache in gebundener Rede" (Consultations in metrical language) has 13 rhyming couplets – the number 8 seems to be preferred: Several texts have 8 lines, "Cinemascope", "Einsätze" (One-Sentences / Entries) and "Evergreens" each have 8 texts.

Of course other numbers can also be found, for example the 7 in "Siebensachen" (Seven Pieces / Goods and Chattels), but 8 and 13 recur with great consistency. Of larger numbers I can only verify the 21: The "novel" consists of 21 individually numbered sentences. Moreover the 5 can be easily verified: "Topographien" (Topographies) and "Zusammensetzungen" (Combinations) each consist of 5 texts. The 3 and the 2 occur too often to have any significance. Above all, the "Sprech-Wörter", which are based on the repetition and rearrangement of isolated phrases, should be remembered: Statistically these phrases occur much more frequently eight, five, three and two times – or only once (as 'punch line') – than any other number of times. Of course this calls to mind the famous Fibonacci [sic] series (1 2 3 5 8 13 21 34 etc.) which, as the "golden section", plays an important role in many compositions including some of my own.²²

L: You could hardly have found a better advocate for Stockhausen!

M: Incidentally, from 1961 to 1963 Hans Ulrich Lehmann participated in the master classes in composition given by Pierre Boulez and Karlheinz Stockhausen.

21 Hans Ulrich Lehmann, "Heissenbüttel als Komponist", in *Begegnung*, Vol. 4 (1968), special issue "Donaueschinger Musiktage für zeitgenössische Tonkunst", pp. 19–21, here: p. 19.

22 *Ibid.*, p. 21.

L: And now we should begin to statistically analyze the *Simple Grammatical Meditations* in view of the Fibonacci series.

M: From the standpoint of language, wouldn't that be a relatively mechanical procedure?

L: Of course Heissenbüttel has addressed the question as to whether or not language can be measured mathematically. He is aware that descriptive and conceptual language traditionally differ from mathematical deduction. With respect to questions of language and particularly of literature, the use of mathematical or statistical procedures does not result from the thing itself – unless the latter is specially adapted to a conceptual framework that allows it to be transformed into numerical procedures and mathematical formulas. The use of mathematically based techniques of measurement becomes problematic if the character of the language itself is excluded from the process of measurement. But wherever language is subordinate to “special formalization” by means of numerical relationships, procedures of mathematical analysis are practically unavoidable. This is the case even in traditional poetry, whose musicality is based on “metrical schemata, rhyme groups and dual couplings”. They are indispensable, however, in analysing literature in which statistical procedures are used as compositional principles.²³

M: Statistical methods of composition have become more and more important in contemporary music.

L: Parallel to this, modern poets organize the hallucinatory space of their texts by means of statistical procedures.

M: And in a work like MIKROPHONIE II the electronic fusion of language and music takes place according to mathematical and statistical criteria. To repeat Heissenbüttel, in *Simple Grammatical Meditations* Stockhausen found a text that had already been prepared for transformation into numerical procedures and mathematical formulas.

4. Ring modulation through performance instructions – a drama in the larynx

L: In conclusion let's take a look at the profusion of imaginative performance instructions that Stockhausen has written into the score for the singers. They run independently and obliquely with respect to Heissenbüttel's text:

“solemn Levite chant, gradual transition to sexy, seductive”, “like a baby”, “in the style of a baroque invention, happy”, “à la jazz, cool, fast – like plucked string basses, gradual transition to like an affected snob”, “like a drunkard, sometimes belching, with hiccup”.

23 Helmut Heissenbüttel, “Ist Sprache mathematisch messbar? Untersuchungen zur Frage einer exakten Literaturwissenschaft” (review of *Mathematik und Dichtung*, Ed. Helmut Kreuzer. Munich: Nymphenburger Verlagshandlung, 1965), in *Die Welt der Literatur*, 3 February 1966, p. 7.